

AVIATION WEEK

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JULY 4, 1955

50 CENTS



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PRESENTS

The ancestor of the guided missile was the aerial torpedo developed by the U. S. Navy and Sperry in 1906-1908.



The amazing progress of science, electronics, radio and radar has brought us a new breed of aircraft called "Drones"—full-sized jet bombers and big four-engined bombers, flying at great speeds with *no* crew.

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FACTS

about

NEW DEPARTURE BALL BEARINGS



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The unique design of the Seal-Set gives optimum protection against dirt, and includes a number of other major advantages.

Seal-Set's are quickly removed, easily replaced. As the seal is of synthetic rubber, in which two radial lips are embedded, a constant seal is maintained between the rings. Internal flexibility prevents distortion of the bearing outer ring due to seal wear, permitting the use of bearings to the higher accuracy specifications. The spring action maintains an efficient sealing contact with the bearing ring to keep dirt and grease lubricant. Seal-Set's are relatively easy to disassemble and operate satisfactorily through a temperature range of -46°F to 222°F . Seal-Set's are available for all higher temperatures. In applications where lubrication is desired, it is easily accomplished by the standard method.

The New Departure Seal-Set basically consists of two separate seal rings. It will be embedded in synthetic rubber, creating a spring which maintains constant seal. The seal is not directly lubricated by oil or grease, but is protected by a thin layer of oil or grease. The seal is not directly lubricated by oil or grease, but is protected by a thin layer of oil or grease. The seal is not directly lubricated by oil or grease, but is protected by a thin layer of oil or grease.



CHS SEAL SET BEARING



SEAL SET BEARING



SEAL SET BEARING



SEAL SET BEARING



SEAL SET BEARING

The diagram shows in section the New Departure Seal-Set Lip contacting surfaces. The face-ground simultaneously with the ball race, giving an extremely high degree of conformity between sealing surfaces and the bearing. Seal-Set is available for a range of sizes in single row, double row, double row and capacities are listed in the latest New Departure catalog.

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NEWS DIGEST



PHOTO SHOWS SHARK MISSILES parked outside the Northrop Aircraft, Inc., plant at Hawthorne, Calif. Wings and movable tail control surfaces have not yet been attached to their canards. Note jet engine on inlet at rear and underside of fuselage. Photo was taken for Avionics Week by William Chaboudy from Embury Ave., a public transportation. Shells have been placed in this area exposed to public view through a wire mesh fence for over a year. They are visible also in private pilots using adjacent Hawthorne public airport. Defense Department also ordered removal of shells from the U. S. Air Force Long Range Missile Test Center, Cape Canaveral, Fla. Cover on top of fuselage is where wingtip wing is attached. Mass center section of fuselage contains fuel to give tank a 5,000-lb weight.

Domestic

Martin T-41 missile was first fired in the latest test by the 60th Fighter Squadron, 1st Air Force, during a tactical exercise that involved 400 of the squadron and all equipment from Bitburg, Germany to Wiesbaden, Germany.

Don Sackett, upper air research vehicle, has been fired to about 70 mi altitude at Wallops Island, Va., for Air Research & Development Command. This is a two-stage, solid propellant system made up of the Deacon rocket and Nike booster. Program will be about 100 mi, measurements of atmospheric up to 100 mi altitude.

Consolidated T-102A turbine side-by-side two motor version of delivering air to weather fighter, has been ordered into production at San Diego. Official price for the T-102A turbine engine, Avionics Week's report of this project Mar 10, 1958, p. 11.

Recent electric energy project is scheduled for completion this month by Fairchild Engine Division, Manassas, N. Y., involving design and construction of "atomic" stage centrifugal compressor for which there was a limited requirement. One will power an engine in the future. The project is a development of present Los Angeles facilities. Key employee was named Robert Woodbridge, Inc. Thompson has stock options rights under the agreement that could increase its interest in the firm to 84%.

Big Gen. Thomas P. Gerety, USAF director of Procurement and Production, has been announced by President

trou, has been announced by President Eisenhower for promotion to major general in the same list to Congress the White House announced Col. Kelly on L. Scott, Jr., present chief of USAF public information, to brigadier general.

Kleins Manufacturing Co., Downey, Calif., will build 100 Super Sabre land aircraft, alcohols, flaps, wing tips, landing edges and slats for North American Aviation, Inc. Contract exceeds \$6 million.

Texascom Airlines will make over 100 Texas Airlines charter flights in July and August, covering student, church and various other travel groups at a round-trip rate of \$300 per person per.

Financial

Merger of Stensberg-Carlson into General Dynamics Corp. has been approved by stockholders of both companies. SDC consolidated net sales for year ended 1957 were \$1,500,000. Consolidated net income was reported at \$1,500,000.

Kearns-Woodbridge Corp. completed \$20 million financial arrangement with Atlantic Thompson Products, Inc. The West Coast electronics firm plans a new manufacturing plant in the Mid West and reorganization of present Los Angeles facilities. Key employee was named Robert Woodbridge, Inc. Thompson has stock options rights under the agreement that could increase its interest in the firm to 84%.

Clara E. Martin Co. declared a 75-cent dividend to be payable July 25 to all stockholders of record on July 1.

Solar Aircraft Co., San Diego, reports \$7,071,000 net profit for the year ended Apr. 30, after provision for federal taxes and income. Net after taxes in fiscal 1954 was \$2,045,000. Gross was made despite dip in sales to \$5,015,000 compared with 1953's \$6,062,000. Bookings as of Apr. 30: \$57,573,000.

International

Indian Air Ministry indicates that it is interested in purchasing 80 Dassault Mirage, supersonic fighters, according to a report to Avionics Week from New Delhi. Also under consideration is the lightweight P-102A fighter, but since the IAF has three Dassault Mirage jet fighters squadrons in service, it is felt the Mirage has the edge in future orders.

Five Vickers Viscounts have been ordered by Indian Airlines Corp., New Delhi for delivery in 1958. IAC also is getting three Douglas DC-3 that are scheduled for use on night aerial services.

Loss of \$1.25 million will help Royal Air Force, London, England, purchase two DC-3s and three DC-3s for planned domestic air service. RAAF, formerly known as Royal Canadian Mounted Police, is getting technical assistance from KLM Royal Dutch Airlines.



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WHO'S WHERE

In the Front Office

Colin Turner, chief executive, Dornier, (Swiss) international office. Dr. Hubert Fock has relinquished his post as chairman and managing director, but continues in board capacity.

Ruth M. Jayman, member of executive committee of board of directors, Northrop Aircraft Inc., Hawthorne, Calif.

Frank Cogut, vice president, Western Division, Los Angeles, Grumman Corp., Bethel, N.Y.

Richard Hodgson, vice president general manager, Reconnissance Systems Division, Fairchild, Camarillo, Indemnity Corp., Springfield, N.Y.

Paul L. Bower, vice president, General Dynamics, Northrop Aircraft Division.

James C. Taylor, executive vice president, defense division, American Airlines.

William H. Bennett, vice president, Northrop Aircraft Division, Hawthorne, Calif.

Clifford G. Galt, vice president, J. M. Smith, vice president manufacturing, William S. Woodward, secretary treasurer, Robert J. Lander, engineering director, and Glen R. Peltier, chief manager, Hydraulic Power Division.

Andrew F. Haddock, executive vice president manufacturing, and Charles D. Johnson, vice president research, Los Angeles, Santa Monica, Calif.

Wm. Alan G. Kirk, president, Vito Precision, Corvallis, Ore.

Frank M. Glavin, vice president general manager.

Robert L. Bunker, vice president, North Division, North Hollywood, Calif., electronic engineering.

Louis V. Moore, vice president controller, General Manufacturing Co., Cleveland, Ohio.

Robert S. Mills, Jr., vice president, Lockheed.

Honors and Elections

Wm. Andrew B. Pitt (USA), full founder of former Consolidated Aircraft Corp. and executive president of the firm, has been elected president of the American Society of Mechanical Engineers.

James A. Kline, president, Federal Institute of Technology, Zurich, Switzerland, has been elected to membership in American Society of Mechanical Engineers.

Changes

John R. Moore and Dr. Robert M. Adley, director and assistant director, respectively, North American Aircraft Division, Northrop Aircraft Division, Hawthorne, Calif.

John A. Rhoads, military and Marine Electronics Division manager, Rema Mott, Hawthorne, Calif.

Paul W. Sullivan, corporate director of advertising, public relations and promotion, Lockheed Aircraft Corp., Hawthorne, Calif.

John J. Jones, industrial sales staff, Empire Aircraft Corp., Hawthorne, Calif.

Arthur Tiedman, engineering director, Hamilton Corp., Los Angeles, Calif.

INDUSTRY OBSERVER

(The editor was assisted by Aviation Week editors who attended the Fifth International Aeronautical Conference in Los Angeles.)

- Republic Aircraft has ordered order for 26 of its T-101s. Plans probably will not be before next year. Because wing is extremely thin, all had to stored in hangar.
- First production F-100A now in at Edwards AFB, Calif., for acceptance. As a special presents the interceptors, heavily loaded with armor test equipment, not loaded to the air line from General's San Diego plant.
- Requirement specifications for 25-seat turboprop-powered DC-3 replacement will be issued by British European Airways in early summer. While new and low engine capacity are both being considered, the final configuration probably will include four-seat turboprops of about 600 cshp each. BEA now operates more than 40 DC-3s.
- Aeromarine changes made in the Douglas F4D to deliver bullet weight by 40 lbs. raised a ton of 1 to 10 knots in cruising speed. Douglas considered the bullet gas worth the loss in cruising speed.
- British European Airways Chief Executive Peter G. Mitchell had exploratory talks on the Lockheed Electra and Douglas DC-3 with officials of the two companies visiting the Los Angeles last week.
- Convair's Sea Dart was given thorough research and development evaluation check at San Diego recently by a Navy Bureau of Aeronautics Patrol team, which is expected to issue a final report in about three weeks.
- British view that wing loadings on American aircraft places have been going up much faster than counterparts on other side of Atlantic is shared by some prominent U. S. designers, who feel that trend has been for these loadings to become excessive. One instance shows attention has been given to problem is in T-40, where wing loading is about half that of F10.
- Bell Aircraft has been conducting wind tunnel tests on boundary layer control for turbojet engines. Indications are that with an installation can reduce stall as well as improve control. Despite the complexity, intense study is being given to the idea. Bell also has been test flying other blades with a 12-deg. twist for reduction in angle of attack to reduce stalling speed.
- Northrop Aircraft was engineer and produce under subcontract the entire tail action of Lockheed Aircraft Corp.'s turboprop Electra if negotiations were successful, an unconfirmed possibility.
- Since aircraft designers believe speed of aerodynamic designs is progressing so rapidly that they see extensive use of titanium will be by passed initially in favor of stainless steel and other alloys.
- Airline operators are leaning strongly toward single-point ground refueling as means to speed turnarounds. This is reflected in Lockheed's turboprop and Douglas DC-3 jet transport. Although in Boeing's KC-119 jet tanker, it probably would be carried over to compare a 787 if it is built as commercial jet transport.
- Development of improved photoplates will continue simultaneously with needed for perhaps 15 to 20 years, according to present projections in some design circles. The lack of an on-board light on photoplate light is now feasible. Detail changes in such areas as equipment, labor and process will be a continuing necessity, but these are considered only capable of solution.
- Handley Page abandoned installation of leading edge slots in its first-generation HP 80 Victor bomber because the wing section was too thin to contain the operating mechanism. U. S. aircraft with only a 4-5% wing thickness have been equipped with leading edge slots.



Rem-Cru titanium is used extensively in such advanced production aircraft as the new North American F-100 Super Sabre and the right jet Boeing B-57 Canberra.



Designing better aircraft with **TITANIUM...**

Titanium's particular advantages become more apparent every day as new applications are developed for its use.

The high strength-to-weight ratio of titanium has become so essential to aircraft designers that this new metal has become available in production quantities. Its corrosion resistance, and complete freedom from stress corrosion cracking, are further aids to greater reliability in high-performance aircraft.

Applications—Fire walls, nacelles, cowling, bulkheads and skin sections of supersonic aircraft are fabricated from Rem-Cru BC-55 and BC-70 commercially pure titanium. Parts subjected to high operating stresses, such as structural members and

jet engine compressor wheels and blades, are made from Rem-Cru BC-130A and BC-130B alloyed titanium grades.

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To keep abreast of the latest developments on titanium, write for the Rem-Cru Review—a free publication devoted to the application and fabrication of titanium and its alloys.

REM-CRU TITANIUM

REM-CRU TITANIUM, INC., MIDLAND, PENNSYLVANIA

Washington Roundup

GM: Top Defense Contractor?

General Motors Corp. is back in the No. 1 defense contractor—and a candidate to Rep. John McCormack, House majority leader.

Since the start of the airlift build up in mid-1950, GM consistently figured in Defense Department reports as the company with the largest dollar volume of defense orders up to Jan. 11, 1954. On that date, Defense discontinued the reports "for convenience" until May of this year, when another report was issued at Congressional request (AW May 30, p. 18). But in the May report, GM wasn't even among the 100 largest contractors. The reason: The period covered was Feb. 3, 1953 to Dec. 31, 1954. GM doesn't say it losing its "best" volume of defense orders.

McCormack's committee started the period from July 1, 1950, when the buildup started with the outbreak of the Korean War, to Dec. 31, 1954. It shows GM topping the next largest defense contractor—Boeing Aerospace Co.—by a wide margin of almost \$2 billion or over \$350 million in defense contracts over \$500,000 in total defense procurement for period.

On Defense Department's recent report showing GM with a "massive" volume of business, McCormack chimed in. "I would think that the former Chairman of the General Motors Corp. would have been hurt at this deep in cold and prodigious with his scientific economic political philosophies that 'what is good for what'." When I read that report my heart didn't want out in sympathy for GM. I could not understand why Charles Wilson as Secretary Wilson should denigrate against the company. But as we turn the real statistics, the picture is different."

The next other top contractor on the list with their percentages of total defense business were:

Boeing Aerospace Co., \$2.1 billion, 4.3%; Douglas Aircraft Co., \$1.8 billion 3.4%; United Aircraft Corp. \$939 million, 3.3%; General Electric Co., \$1.7 billion, 3.2%; Lockheed Aircraft Corp., \$2.0 billion, 2.5%; North American Aviation \$2.8 billion, 1.4%; Curtiss-Wright Corp., \$2 billion, 1.3%; American Telephone and Telegraph Co., \$1.2 billion, 1.2%; Ford Motor Co., \$1.7 billion, 1.4%.

Pentagon Departures

Not once the departure of Roger M. Kees, first deputy to Defense Secretary Charles E. Wilson, gave regarding top personnel changes created as much speculation as the forthcoming departures of Roger Lewis and Robert B. Anderson, two high-regarded Pentagon executives. Lewis, Assistant Secretary of the Air Force for Material, will neither confirm nor deny reports that he is resigning in September. He told Aviation Week he plans to stay (not true), and he believes they should not be discussed at this time. He is expected to leave after Wilson and Air Force Secretary Harold E. Talbott find a successor for his hard-to-fill position.

Anderson, Wilson's deputy in leaving and proceeds an engineer to both the joint and the Administration. Editorial guess that he will go back to his \$60,000 a year job as manager of the Wagoner Estate, a Texas company, but evidence by the speculation in a Washington newspaper says he will stay. Mr. Anderson wants to sell their house in Venice, Tex.

A most likely possibility: The Andersons will move

to Houston, Texas where he can take up his entry in a Democratic poll, seek the Texas governorship. Possibly this would take him 45 miles closer to the way from the Office for Eisenhower organization he headed in 1952, along with a lot of Texas Democrats who were in that camp.

Pentagon Switch

With both Congress and the press aroused over Defense Department's attitude on public information, there was again last week that the Pentagon has started to retreat in its effort to control dissemination of news. Assistant Defense Secretary Robert T. Ross, former Republican Congressman from New York, would demand that the department "should or would give judgment on what is useful or interesting" (AW June 27, p. 10).

The Ross stand was taken in a letter to Sen. Carl T. Curtis (R-Neb.) who had written that "some of my friends in the so-called press" were concerned by policy statements being issued by R. Karl Hansson, public affairs deputy to Ross.

Earlier it was announced that a special government information subcommittee headed by Rep. John Moss (D-Calif.) plans to investigate thoroughly the whole field. The first of government information to trade and other private organizations, as well as the press, is among executives, agencies and policies of various agencies on furnishing information to Congress.

In appointing Moss, Chairman Wilbur Dornan of the House Congressional Operations Committee and that it should be determined whether there is a unified "withholding or suppressing" of information. Other members of the special subcommittee are Rep. Dante Ferrell (D-La.) and Rep. Glen Hoffens (R-Mich.). The investigation has been under consideration for some time, but Defense Secretary Charles Wilson's new information policies added fuel to the fire.

Scheduling Row

An Air Line Pilot Association and Civil Aeronautics Board are meeting over airline flight scheduling. Friction stems from the disputed nonstop operations of United Air Lines, Trans World Airlines and American Airlines.

ALPA President C. N. Saxon has supplied CAB Chairman Ross Butler a chronology of action from February 1954 to May 1955. Saxon says the record reads: "An Alcoa in Wonderland story of a problem caught in the bureaucracy of the Board with no one apparently willing to take the responsibility to represent the public interest on this critical problem." He accuses the Board of failure to establish standards of schedules in airline scheduling.

CAB's answer came in a letter from Comptroller Chief Robert L. Griffith to Saxon in which he expressed "superficial investigation." Griffith pointed out that ALPA could have filed a formal complaint at any time, but he failed to do so. He pointed out that their investigation of nonstop service, nonstop schedules on American have been long-faced 50 minutes, TWA 74 minutes and United 40 minutes.

Griffith told Saxon: "It is understandable that we are not being proceeded as you would have had in practice, and I can assure you that we have not proceeded in the manner would have had in practice." He said the judgment of his office has been directed toward the public interest.

—Washington staff

NACA Tackling Hypersonic Problems

By William Goughlin

Mellett Field, Calif.—Problems blocking the development of intercontinental ballistic missiles and hypersonic aircraft—aerodynamic heating, stability and control—are now subjects of a major research effort by the National Advisory Committee for Aeronautics.

NACA spelled out these problems in detail and the research efforts aimed at their solution last week before industry, military and press representatives at the Ames Laboratory technical symposium.

Highlights of the Ames symposium included:

- Finding an hypersonic flight and its accompanying aerodynamic problems.

- Discussion of dynamic and static stability problems which have been encountered in earlier and research aircraft already flying.

- Finding on the B-47 flight test program which NACA has been conducting in static aircraft models.

- Report on the extensive use of analog computers in a basic flight research tool—termed "one of the most significant recent developments" at Ames.

- Report on the further, most heated findings which will go into operation at all three of the main laboratories centers of the NACA this year. These findings are designed for studies in a speed range from under 550 mph up to five times the speed of sound.

It was apparent that as more studies the progress between the basic research underway at Ames and the design on the drawing boards of the industry is becoming research routine.

Solution Conflict

In many instances the solutions are beginning to conflict. The pointed bodies and sharp wings desirable for hypersonic flight, for example, have been shown to be the least desirable from the standpoint of the formidable problem of aerodynamic heating. Sharp leading edges and surfaces heat up much less rapidly than blunt edges.

"Confusing research is bringing a realization that at even the relatively low supersonic speeds aerodynamic heating will profoundly complicate design problems that are already difficult," said Dr. John F. Victoria, NACA executive secretary.

Problems of aerodynamic heating will be far more difficult to solve than those of guidance and propulsion. Aerodynamic problems will be a pressing problem under study, a method

of "aerodynamic cooling," sometimes referred to as "nose" cooling due to its resemblance to the system which cools the human body. In this method, liquid or gas passes through a porous skin to cool hot boundaries. Layer of air.

NACA studies indicate that such a method would require a flow rate only one-tenth that of a more conventional internal coolant flow in which the cooling liquid is circulated under the aircraft as inside skin and then dumped outboard.

"Since the coolant must be carried in the aircraft, this is a great advantage," a researcher pointed out.

Dynamic Stability

Problems of air speed regimes accompanied by rapid changes in the shape of aircraft, has had a profound effect on dynamic stability, the control and control. At an example, a

the fixed forward low damping of oscillations at high Mach numbers which is bringing a "new family of troubles."

However, changes in aircraft to improve dynamic stability often penalize the performance of the aircraft so that it cannot achieve the needed speed or range. In some cases, it has been necessary to modify dynamic stability for good high speed and altitude performance.

Within the last year, several modern aircraft have gained into serious difficulties during rolling maneuvers, NACA researchers said. Sometimes when the pilot has attempted rapid rolling, a violent yawing and pitching motion has ensued which was uncontrollable by the pilot. The conventional required. Violation of the maneuver caused the airplane beyond the safe limits. Changes in weight distribution were blamed for appearance of this problem.

The problem is interested in velocity, the fact that it is possible to roll against aerodynamic forces to roll against the yawing motion, roll against the aircraft completely, instead of the usual roll motion, yawing motion. With most of the new design aircraft, the roll motion is controlled by the use of



SLOTTER WALLS OF NACA Ames 14-47 turbine wind tunnel prevent airflow disturbance to pass through the openings while sufficient solid area is retained to guide or otherwise put model. Design is key to tunnel's ability to meet various maximum speeds.

plant, aerodynamic forces set up by the rolling motion lead to wing the nose and tail outward from the roll axis. The aircraft therefore yaw about its center of gravity, with an extremely violent action.

Automatic controls offer one solution to these dynamic stability problems, NACA scientists indicated.

Static Stability

Static stability of hypersonic aircraft is being seriously investigated, NACA reported, for vortex and shock waves at velocities.

Various problems are not limited to hypersonic aircraft, as NACA's research capsule said, but it is concerned by supersonic design with shock waves, larger and sharper wings and the fact that the vortex itself is stronger at higher Mach numbers. Design of shapes and positioning of control surfaces is extremely important to be used to prevent vortex flow from wings and fuselage interfering with tail surfaces.

NACA is developing methods to predict the path of these vortex flows and avoid serious difficulties with them. Shock wave interference from wings and wing-engine nacelles can interfere with static stability when these waves

flow across control surfaces, Ames engineers demonstrated. The 5 by 5 supersonic wind tunnel was used to show the shock wave flow over a model and its effect on a shock at Mach 1.6.

An extensive flight test program with a Boeing B-47 has indicated that bending of flexible wings can change the flight characteristics of an aircraft by as much as 10 percent.

Automatic controls offer one solution to these dynamic stability problems, NACA scientists indicated.

During the test program, the B-47 was held about 30 ft from a problem in a pull-up maneuver. Such continuous bending of flexible wings problem a bending which can alter flight characteristics. These effects can be alleviated by placing upright near the wing tips in the form of engines or fuel tanks a procedure said on many aircraft already flying.

Aerodynamics is also an important factor to be considered in the design of aeroplanes, NACA warned. Said a researcher:

"The aerologist considers the airplane motion, computes that with the desired motion, and then sends corrective signals to the controls. Success such as these become potentially dangerous on

a flexible airplane because a measuring device on the airplane cannot distinguish vibrations of the airplane structure from vibrations of the airplane as a whole."

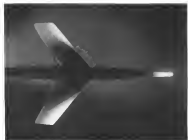
Resulting aerologist signals could produce aerodynamic response. In past vibration that could result in structural failure, he said.

Four studies with the Boeing B-47, NACA is providing data to aid in the design of transport and bombers which use conventional wings without aerodynamic margins of stability and control.

Analogue Computers

Use of analog computers to simulate aircraft response computers. In early actual flight test results in many instances, NACA and test flight tests must be conducted to assure that the correct equipment are being fed into the computer, it was emphasized.

Researchers reported that analog computers have been used successfully to check out proposed control systems prior to flight as well as the studying the dynamic properties of the airplane itself. NACA scientists noted that increasing use of these computers a new technique which is significantly increasing the "flexibility and the safety of much of our work."



HEAT BUILDS UP nose, wings and thin wing leading edges of model than on its thicker portions, NACA notes photo taken during test in hot gas nozzle.

How to Evaluate Compatibility

An adequate plan for evaluating compatibility of a particular induction system and engine combination, GE's J. A. Allard should include the following factors:

• A first analysis of the induction system as a total based upon the wide range of pitch and yaw angles, mass flows and Mach numbers required by the particular operational mission.

Measure flow distribution patterns and compare with actual flow patterns from inlet ducts having good distributions, for induction whether the duct should be elongated before proceeding.

• Determine whether the engine will tolerate the flow distribution without unacceptable penalty in performance, blade vibration or cost and stability of operation.

Install a full-scale induction system on the engine in a static test stand.

• Install suitable sensors in a special inlet duct test to test the engine with inlet ducts from simulating those occurring in flight.

To evaluate behavior of a constant engine speed, tests should be made in a facility providing an adequate supply of inlet air. Data resulting will give a complete picture on whether the particular inlet duct and engine are suitable combined.

• Flight tests in the actual engine will give the final definitive answer on the possibility of inlet duct and engine.

must be compatible with efficient designs of the main structure, cockpit and engine not leading gear. Doors, when they have sharp corners and bends, a frequent source of flow separation.

COR design also flow into and high angles of pitch or yaw also come. Flow separation, increasing the range of inlet duct flow parameters and angles over which stable and efficient operation must be provided to meet the difficulty of providing a uniform inlet velocity to the compressor for all conditions.

Allard cited this example: During flight at supersonic speeds if the throat is quickly reduced so that engine inlet mass flow is substantially reduced, a flow instability known as "buzz" occurs in some induction systems. Resulting large amplitude of pressure pulsations may create a safety hazard as well as an unstable main engine condition.

Flow Improvement Devices

Under certain conditions freestream static pressure can be applied successfully to improve inlet conditions on an aircraft at the compressor face. The resulting blade boundary layer energy from regions of high and low velocity, in those where the velocity is low. Allard stated:

• Screens placed across the inlet also are effective in reducing distortion but the screens lack higher static pressure but must resort to other means for solving the problem.

• A deflector when followed by a rapid acceleration reduces the distortion at the compressor face. Effectiveness appears to depend partly upon airway.

In addition to the different present methods, Allard said, a deflector could be a different means to be tested.

• A relatively ducted cylindrical section of duct, when placed ahead of the compressor face results in raising in the inlet static pressure and distortion is reduced. Here again, space limitations in a fuselage.

• Stationary mixing devices have been used to increase length a barrel. These mixing devices have been used at times to correct redistribution of flow from the compressor discharge to the combustor chamber.

However, relatively little work appears to be required in this field. Allard said, "These devices do correct flow distortions from the induction system."

Allard believes an experimental program is required to evaluate the tolerance of various compressor designs to inlet flow distortion.

If inlet engines were designed de liberately to tolerate large distortions of flow, it would substantially increase the specific weight of the engine. It would be a mistake to base engine design on the flow distortion distribution.

Engineers must be concerned with improving this even engine weight and performance loss.

Defense Management Shakeup Is Urged

Washington, D. C.—Creation is the Air Force, Navy and Army of positions for an Assistant Secretary for Research and Development and Assistant Secretary for Logistics has been proposed by Congress by the House Committee.

For the interim and interim solution, this is the most important change recommended in the 148-page report on House Organization of the Defense Department.

At the present time only the Air Force has an assistant secretary solely responsible for research and development. The Army has an Assistant Secretary for Logistics, Research and Development. The House report calls for splitting this into two separate jobs.

Navy does not have either logistics or research and development specifically handled in an assistant secretary position. The report would be the formation of a new Defense Supply and Service Administration at the same level as the three services. The report says this would be the most important step toward saving about \$2.5 billion annually. The proposed solution would be concerned with the purchase of common use, common stock and material supplies.

Coordination Obstacles

The commission said that four obstacles are impeding close and productive working relationships among the defense agencies. They are:

• Overlap and redundancy of staffs, both from the Joint Chiefs of Staff to the Assistant Secretaries of the Defense.

• A weak link exists in top defense management which depends on rather than on the intended line of staff officer participation in the defense management of defense plans and programs.

• Assignment of responsibilities among members of the Secretariat in the Office of the Secretary of Defense appears overlapping and inconsistent.

This is due to the structure of the Secretariat members since liaison with National Security Council, Joint Chiefs of Staff and other staffs, coordinate all guidance provided at the Office of the Secretary of Defense level to the military departments covering the preparation of requirements program, provide for a nation of effective review and analysis of defense plans and requirements.

• Emphasize the management of logistics in the military departments.

• Responsibility for the management of support activities is not clearly defined between the military authority and the principal command executives.

"The total management job in the Office of the Secretary of Defense," the

commission said, "has been subordinated to a manner which creates problems of coordination among some of the principal activities (particularly in the areas of supply, logistics, research and applications engineering). Furthermore, the present organization results in reduced working relationships with the military departments since it is more effective from the Secretariat within the three departments where actual operations are performed."

Demanded Systems

The commission stressed improved systems for most of the difficulties encountered by the Defense Department. "These officials have struggled with the problems they have brought about many improvements. Considering the difficulties under which they labor, the Defense Department is better off than it was when it was created."

Many of the weaknesses mentioned are due to the expansion of the military services in 1945 from a total of about 1,000,000 to nearly 3,000,000, the commission said.

"Because serious service is at stake, we cannot be too firm," the commission said. "In the words of a prominent Big Office, our military

people are not hard primarily to see how they can get along with, they are hard primarily to risk to get enough material to meet their requirements."

The commission also recommended a reduction in the number of assistant defense secretaries from 14 to 12.

• Assistant Secretary for Research and Development. Responsibilities of the present Assistant Secretary for R&D and the present Assistant Secretary (Applications Engineering).

• Assistant Secretary for Personnel Requirements. Responsibilities assigned to the Assistant Secretary (Personnel and Personnel) but with increased attention to career development.

• Assistant Secretary for Financial Management. Responsibilities now assigned to the Assistant Secretary (Comptroller), but with increased attention to accounting policies and other financial policies.

The committee making the study was headed by Charles R. Block, of Ames Steel Corp.

as the forward part of the induction system. Free flow distribution is not, can result in serious distortion in engine compressor inlet oxygen, particularly for an engine that is still sensitive.

Example: In the case of the F-4D, inlet ducts with the original inlet and engine configurations gave some pressure falls during climb conditions at altitudes as high as 30,000 ft. below this, these a small change.

In the case of some engines, he says, poor inlet flow can result in robustness on the rotating parts and possibly engine hot spots. Distortion obviously has in the development of improved inlet systems and less sensitive engines.

Several other problems which are associated with high speed aircraft performance include inlet ducts which have flow separation ahead of inlet at low or high angles of attack.

At high angles of attack, inlet ducts at low mass flows, and symmetric duct flow, which can result when two ducts are joined under conditions of low mass flow.

Performance Factors

Eric S. Mehl, of Hamilton Engine Co.'s chief engineer, also touched on an inlet engine performance factor in his paper "Power Plants for Supersonic Flight."

If internal losses and leakage are, he is kept to a minimum in inlet ducts the ducts should be matched in needs in the leading to the leading a percentage of the engine, he says.

With adequate amount of it usually possible to strike a compromise and select an inlet having reasonable efficiency, but the whole operating range.

"At supersonic speeds, such a compromise is difficult and at all design conditions, engine's updraft and

port pressure recovery can occur."

"An adjustable guide" or controllable should include a good pressure recovery to be maintained over a wide speed range is variation in area of the inlet to maintain the velocity and constant external losses." This inlet consists with Hamilton's view.

While an intake of variable geometry adds weight and complexity. Mehl closed, in addition, it is a real factor in determining the overall efficiency.

Connecting on typical inlet design and adjusted for selected flight speed, he points out that the pressure at 100 ft. of total level can amount to 100 lb. falling to 24 lb. at the propeller, but rising again to 30 lb. if the speed is increased to Mach 1 at the same altitude.

Presenting "Inlet definition" paper titled "Inlet Design Factors for Compatibility," General Elmer C. J. S. Allard declared that an adequate test program of matching the induction system to engine requirements should be followed for each installation.

He urges engine and engine builders to improve compatibility of the inlet duct and engine through adequate pre-planning in these areas:

• Design of induction system for good flow distribution.

• Development of flow distribution devices.

• Design of compressors to tolerate relatively distortion.

• Providing adequate margin in the engine cycle.

• Development of more accurate engine control.

• Matching inlet flow distributions to engine requirements.

The House Commission report on budgeting and financial management by the Department of Defense is reviewed in an article on page 21.

Hoover Unit Proposes 19 Changes

The Hoover Commission report on business organization of the Department of Defense offers the following recommendations to the Secretary of Defense:

• Appoint an assistant secretary to each Assistant Secretary of Defense of such status and competence that conformity of administration will be improved.

• Review the management of departmental activities. The committee suggests a uniform grouping of management responsibilities similar to that prepared for the four management Assistant Secretaries of Defense.

• Develop the management of the military chain of staff in the support activities at that of planning and requesting the material, services, facilities and specialized personnel required to support the operating forces subject to the review and approval of the Secretaries, exercising direct authority over tactical and combat-related support activities performed by the logistics organizations.

• Assign to the Assistant Secretary for Logistics in each department direct management control over supply and service activities.

• Assign clear responsibility for the coordination of research and development

programs in an Assistant Secretary for R&D in each department.

- Establish a personnel system to support activities which provide comparative standards for selection, training, promotion, and compensation of both civilian and military managers and technical personnel.

- Require members of the Secretaries to participate in developing and apply the career management program in activities under their jurisdiction.

Following are their recommendations regarding congressional action:

- Enact legislation establishing a separate civilian managed agency, reporting to the Secretary of Defense, for common supply and service activities.
- Legislation establishing the separate supply and service agency should specify entities which will assure a direct supporting role for the agency.

- Separate agency should be named the Defense Supply and Service Activities Institute, and its administration should be a presidential appointment.

- Instruct the Secretary of Defense to report semi-annually on progress being made in improving all phases of the supply and logistics system.

- Enact legislation to remove present obstacles to government service by transferring officers and should provide positive incentives which will attract and hold able administrators. Examples of suggestions which should be made are: increase the level of compensation for assistant secretaries; modify the "ceiling" or "maximum" level so that presidential appointment can not be forced to negotiate lifetime business contracts in order to accept federal appointment.

- Enact a Title V to the National Security Act to provide the legislative basis for supervising management and technical personnel in the support activities. This legislation should establish these basic principles: civilian personnel will be limited primarily to posts in tactical organizations, and civilian personnel will be utilized increasingly in management and technical positions in support activities. Civilian will be attributed for one determining these management and technical positions in support organizations which will be filled by civilian personnel and those which must be filled by military officers.

- Incorporate criteria in title V to the National Security Act which will clearly distinguish the proper roles for civilian and military support agencies and both must be filled and should direct immediate application of these criteria by the Secretary of Defense.

- To improve the financial tools of management Congress should bring legislation to enable the Department of Defense to prepare and administer budgets on an annual expenditure basis. Department of Defense should

continue and extend the use of systems of annual and cost accounting and wherever it will add to efficient work against the use of non-fund capital funds. Department of Defense should intensify its efforts to establish controls for military services and continuing and effective incentive controls.

- To its responsibilities for managing defense dollars each Assistant Secretary of Defense should be responsible for increasing the equipment program at each department for his area of functional jurisdiction and for advising the Assistant Secretary of Defense for Defense.

Jet Engine Policy Stresses Quality, Not Standardization

New Defense Department policy governing development of jet engines has been written to emphasize quality instead of standardization.

Distributed to the industry last week, Directive 5233.2 describes proposed, revised strategy and engine development set forth in an earlier draft and represents a victory in the resolution which pointed the original proposal (AW Jan 24 p. 14).

In addition, the new directive makes it clear that the Defense Department intends no longer to keep engine factories but ask license the government has a substantial involvement in new plants. Manufacturers who cannot demonstrate performance, capability and a contribution to the art will be handicapped under the system.

Responsibilities Outlined

Major points in the directive are:

- Army, Navy and Air Force are made individually responsible for determining their requirements, planning and implementing their programs.

- At Defense Department level, responsibility will be limited to overall policy to insure that policy is followed; programs are sound and integrated and funds effectively utilized.

- Military requirements must be flexible to provide for changing technology and they must take precedence against economic modifications and limited cost test capabilities.

- In each category, basic engine thrust classes should be established with each class approximately 50% larger than the next smaller class.

- The three services must have frequent evaluation of individual projects.

- Competition must be fostered within the industry.

- Effective use must be made of the assistance in the industry, but it must not outweigh factors of performance, capability and contribution to the state of the art.

General Management is to the first-hand made for each activity, each departmental interest service should be held responsible for securing requirements and in participating in the formulation and continuing review of its budget for these activities and programs under its jurisdiction.

- Congress should amend existing legislation to assign each Assistant Secretary for General Management executive supervision of the departmental committee organization, providing legislative action. Secretary of Defense should accomplish this by directing:

- Mobilization base must be maintained.
- Army, Navy and Air Force must follow uniform policy in financing new engine development projects. Research and development funds should be limited to new design concepts and preliminary funds used for making them operational viable.

- Mobilization base must be maintained.

- Army, Navy and Air Force must follow uniform policy in financing new engine development projects. Research and development funds should be limited to new design concepts and preliminary funds used for making them operational viable.

Competence Emphasized

In an outline of procedures further emphasis is put on the competitive aspects of engine development, a factor that the industry felt was in jeopardy under terms of the original Defense Department proposal put forward early this year.

"When appropriate" the procedure says, "the services should conduct formal competitions among all capable companies to bid on a new engine development to meet stated requirements. Such bids should be evaluated in accordance with formal rules established by the services."

To insure satisfaction it was appropriate to encourage the companies to track the nation's population problem on a broader scale. This process is more likely to develop novel approaches which men have long long ignored.

"If a company proposes a novel and significant engine development project, and if management service that no other company can provide in good a solution during the same time period, a sole source contract may be awarded without formal competition."

Provisions of the new directive will be mentioned by the Joint Chief of Staff, Committee for Public Affairs, and by members from the office of Donald A. Quade, Assistant Secretary of Defense for Research and Development; Frank D. Newberry, Assistant Secretary for Acquisition Engineering and areas offices from the three military departments.



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FLY WEATHER-WISE

These weather items prepared in consultation with the United States Weather Bureau

TERRAIN

THE VARIOUS TYPES OF TERRAIN SURFACES have a significant effect on the air masses flowing over them—with a consequent effect on the weather and plane performance.

One of the most significant effects of terrain on air currents is the Mountain Wave—a high reaching deflection of the wind when a ridge of hills blocks a strong flow of air. This sets up a "wave" which may reach high altitudes and extend in a chain of waves for several hundred miles downstream. The Lenticular Type Standing Wave Cloud identifies these huge waves. Even small airplanes can be waves and produce dangerous downdrafts on the lee side (see diagram on right).

Care should be taken in approaching a ridge into the wind, because in a low powered plane the downdraft may make it impossible to maintain enough altitude to clear the top. Also, when taking off on a runway towards a hill, be prepared for a decreased rate of climb if the wind is coming over the hill.

When flying in the vicinity of mountain tops, the possibility of altitude error is important. Two primary factors can cause altimeters to indicate higher altitudes than actual. Low-level pressure caused by disturbed flow on the lee side and abnormally cold temperatures. Combined, they can produce errors in excess of 1,000 feet.



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Hoover Group Urges Effective Military Fund Curbs, Reforms

Washington, D. C.—Budget reform to do away with the current fiscal year to year of huge unexpended appropriations justifiably in the Department of Defense, has been recommended to Congress by the Hoover Commission.

Pointing out that the federal government's current funds are as high as \$78 billion in Fiscal 1954, \$68 billion in Fiscal 1955 and \$111 billion in estimated \$54 billion in Fiscal 1956, the commission called for more effective control by Congress of the executive branch.

The report and the commission's task force found the procedure has been "to review in minute detail the new program for the budget year under consideration, with little consideration of past performance. This procedure applies particularly to military procurement."

'Combustible Structures'

In addition, the report says, effective fiscal management in the Defense Department "has been hampered by over-detailed and combustible allocation structures." It continued:

"The effect of attempting to control operations through such a system often compels upon the ability of agencies to deal with to expand no more than predetermined ceilings. The ability to live within such ceilings is an real sign of performance. Such a system actually puts a premium on the ability to expand all differences since the allocations for one year are used as one indication of the amounts required for the succeeding year."

Other findings included:

- Funds should be controlled under a system whereby they would be only be allocated to an operational unit from such specific appropriation.
- Accounting systems should be developed from which performance can be appraised in terms of cost.
- Costs of military support activities must include in this do not rest, the cost of military personnel employed in them.

The report is an opening a budget as terms of future obligations rather than expenditure has its greatest impact in the Defense Dept., where 45% of the budget is for multiple year programs.

Lacks Screening

Additional evidence of the Defense Department was made over the lack of effective coordination both at the Department of Defense level and in the Army, Navy and Air Force. The Hoover Task Force said creation of a defense

comptroller in 1949 was a sound step, but the annual review, a too much burdened with matters of operating policy.

The report said:

"The lack of a civilian screen in the Office of the Secretary of Defense on Military Logistic Requirements, has resulted in reliance on financial controls contained in the comptroller as a substitute for such a screen."

If the Assistant Secretaries of Defense who are responsible for the actual functional areas of the department's activities made a more searching review of the requirements under their respective jurisdictions, the comptroller could be relieved of heavy responsibilities in a field which is not legally his.

The report said responsibility in the three branches of the armed forces should be cleared and contained in each branch's Assistant Secretary for Financial Management.

"There is no possibility," the report declared, "for making that a function for which the chief of staff should have responsibility."

In the Army, the comptroller, Lt. Gen. George H. DeLong, is under the office of the chief of staff. In the Air Force, the comptroller is Lt. Gen. C. B. Stone III, a deputy chief of staff. Navy's comptroller is a civilian, William B. Frank, on the executive office of the secretary.

Comptroller Requirements

The Hoover task force calls for more close supervision in the military budget office and says that the comptroller should be confirmed in all cases for the Defense Department, it makes two recommendations:

- That in selecting individuals for

Renegotiation Approved

A person authorizing the holding of loans against profits over a two year period in renegotiation determination was approved by the Senate as pending legislation extending the Renegotiation Act to Dec. 31, 1955. The measure has already passed the House.

This provision, and another provision authorizing a study by the Joint Congressional Committee on Internal Revenue to decide whether renegotiation should be extended beyond 1956 are at issue before the joint conference committee moving and differences between the House and Senate versions of the revenue measure.

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PERFORMANCE: Total pressure up to 40 inches of water; Airflow up to 10,000 cfm

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OFTEN

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More Viscount Sales

Total sales at Vickers-Armstrong's subsidiary Viscount have increased to 127 with new orders from British Overseas Airways Corp., Hughes Tool Co., Standard Oil Co. (New Jersey) and New York's Fuel Oil Air Transport Ltd. Value of Viscount sales so far more than \$175 million.

Hughes purchased a Viscount "for study and analysis of the operation of propeller turbine aircraft," and Standard Oil ordered an executive version of the plane.

BOAC purchased 12 Viscount 700Rs for delivery in mid 1955. Sir Miles Thomas, chairman of the airline, said the transports will be used on Caribbean and Middle East routes.

The Norwegian airline placed a contract for one Viscount in addition to two ordered in January 1954.

competitiveness, evidence with broad management and accounting experience and competence he appointed.

• That the complexities of military departments be impossible only to the secretaries of their respective services, and that management responsibility to a chief of staff or equivalent be demonstrated.

J. Harold Stewart of Boston was chairman of the commission's task force which undertook the budget and accounting study.

Board Proposes Lower TWA, PAA Mail Rate

A new lower service mail rate for trans-Atlantic operations of Trans World Airlines and Pan American World Airways has been proposed by the Civil Aeronautics Board.

The new final rates set through a ruling relating them to recently established service rates for the Big Four domestic airlines, are \$4.75 cents per tin mile for the period Apr. 8 to Dec. 31, 1954 and \$1.5 cents for the period starting Jan. 1, 1955.

CAB estimates that the new rate would reduce service mail payments to the carriers \$6,000,000 this year, compared with pay due under the old 55 cent rate.

The lower 1955 rate is based on an estimated increase in mail traffic compared with 1954, due largely to increased shipment of military mail. The Post Office Department estimates that Pan American will fly 10,455,000 mail ton-miles this year, compared with 7,504,000 ton-miles in 1954. The rate for TWA is 8,754,000 ton-miles this year compared with 6,919,000 ton-miles.



The taming of the Blue

Mastery of the sky is not achieved through bolts and rivets — nor is cold metal the true measure of the task.

The fier of the conquest is found in men.

That we know — for in building wings and setting them we have come to know something of the man who plans and the man who glides our nation's aircraft.

We have seen their fingertips—those planners of delicate who charge us with the task of helping build a strong, securely America.

We have seen their courage, their skill, their daring—those men who wear the wings and fly the ships in the service of freedom.

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CAB Cuts Mail Pay Of Three Carriers

Mail pay for Braniff Airways, Pan American-Globe Airways and Alaska Airlines has been cut by the Civil Aeronautics Board to reflect recent reductions in passenger load.

All three carriers are in temporary lull, and the Board has made the reductions in line with its policy of setting passenger rates sufficient to cover only losses.

Panama, whose current temporary rate produces \$2,750,000 a year, will operate with annual mail pay of \$593,000 after Jan. 1, 1955. Braniff's mail pay is reduced from \$1,775,000 to \$1,350,000 a year after Jan. 1, 1955 for Latin American operations. For domestic operations, the carrier will be paid at the same rate established for transients.

Alaska Airlines' mail pay would be reduced from \$2,511,000 to \$2,117,290, effective Jan. 1, 1955.

Airline Wins Round In Fight Over Name

North American Airlines won a round in its legal fight to keep its name when the U. S. Court of Appeals reversed a Civil Aeronautics Board decision which denied the manufacturer's carrier use of the name North American Airlines.

American Airlines contended in the case that North American was infringing on the established name of American. The court agreed with the findings of the commission in the CAB decision that there is no evidence of proof that North American adopted its name with intent to deceive the public or trade upon the goodwill and business reputation of American or that American has been injured by such action.

North American is now awaiting a decision in a similar case brought in California by North American Airlines.

New Crash Barriers

Three current crash barriers, recently certified from the tower, have been installed on Republic Aviation's field at Farmingdale, N. Y. They can stop an F-84F Thunderbolt, going 150 mph, in about 600 ft.—roughly half the distance needed to bring the plane to a halt.

When the coated honey-combed structure is hit, two 4 ft. angled steel posts rise on each side of the runway, engaging a nylon and canvas net which is attached to heavy anchor chains. Cost was \$125,000. Similar barriers will be used to stop Air Force jets in Korea (AV 6/15/53, p. 18; 7/13/53, p. 21).

Feeding-tubes for hungry engines do a vital job . . .



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each joint
qualifies

GETTING the food and drink to the several thousand "metal bones" in a modern aircraft engine is no job to be taken lightly. Dependability is paramount. Safety is first. And lightness a prerequisite.

Joining these vital feed lines is a job for welding and brazing. And with radiography to prove each joint sound, there can be no dispute as to the acceptability of the work.

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greatly extended the fields where welding can be used. It can bring you new business, too. To explore what radiography can do for you, get in touch with your x-ray dealer and talk it over.

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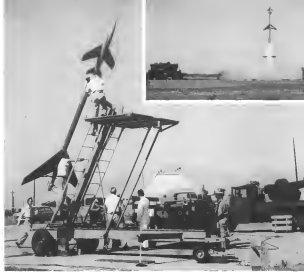
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SELMAN TIGER MODEL gets check by Aerobid Development Corp. crew before free flight test of supersonic fighter characteristics



SIMPLE CONFIGURATION can be expanded to take broader up to size of Nike missile. Tests take place at White Sands Proving Ground.

Supersonic Models Provide

A small supersonic model of a new aircraft stands late the test above New Mexico's White Sands Proving Ground. Pushing the model at ever increasing speed is a booster rocket.

Tracking devices follow the tiny model across the sky at its 100-mph and use vital information to correct on the ground.

This is a relatively new research tool in probing the unknown areas beyond the speed of sound. In the new design, Mach 1, the knowledge of aircraft designers reaches only as far. If not tested earlier in the supersonic ranges they are always produce the data desired. One answer to this is in supersonic wind tunnel tests with free flight testing of rocket-propelled models.

National Advisory Committee for Aeronautics pioneered techniques in this field. General, Lockheed, and other manufacturers have done a great deal of free flight research with models.

By William J. Coughlin

Passaic, Calif.—Aerobid Development Corp. is offering defense contractors a universal package for free flight testing of their new supersonic designs, either aircraft or missile.

The package includes design, construction and instrumentation of the test models; firing, data collection and reduction.

Aerobid says it can deliver a project's final report within six months from the time it starts work on the model. The free flight data compares favorably with both wind tunnel and actual aircraft performance, according to company

Missile Design Shortcuts

president E. G. Croft. "We are willing to guarantee accuracy of the data within 5%," he says.

Data is obtained by telemetering as well as ground tracking. This raw data is sent to the defense computer to gather with the Aerobid report as the designers themselves can interpolate it in terms of the final airplane or their design.

"We do not make a practice of telling the manufacturer what his drag coefficient is and then arguing about it," says Croft. "We tell him what it is on the basis of our data reduction and he can use the raw data to apply as he sees fit."

In some cases, the precise computer never even touches the model or the test, but only the final report and raw test data. Configuration tested and test ratios are among the most closely guarded secrets in the industry—not only for reasons of military security but also for competitive reasons.

"One of the best uses of the free flight technique," says Croft, "is in design competition. It is a competition for a military aircraft, the government wants some performance estimates. The company that comes through with some test data and drag coefficients and has some actual free flight test data is in a stronger position. He is better

than a man with just an estimate. That is where we really come in.

"In a big competition, it may take six months to write the proposal. We can give a customer actual data within six months while he still is preparing the proposal."

Rocket-Powered Models

Aerobid has built several models which contain their own rocket power plants. One of the problems in wind tunnel testing is accurate measurement of the effect of rocket fire around the tail of an aircraft. By the use of small rocket engines, Aerobid can simulate the actual flow out of tailpipes or no-

MACHINES AND FACILITIES

Loud Grows to Serve Industry Better

• Loud meets the increased aircraft demands for quality and economy with expanded facilities and equipment.

► **History**—From a small repair shop started in 1939 Loud has grown into one of the most completely equipped job machine shops in Southern California. This modern plant, including engineering and test laboratories, occupies about two hundred thousand square feet and employs approximately seven hundred persons.

► **Facilities**—Within this modern completely equipped plant fabrication of the smallest precision valves to the largest aircraft structural fitting is accomplished. Loud is one of the very few plants equipped to handle all phases of manufacture from raw material to finished product in one plant. One of the largest milling departments in the West contains thirty large mills, over 30 of which are of the hydraulic automatic duplicating type. Other manual equipment includes dual welders—one an 80 KVA gas plant capable of up to 12 square inches of chrome only up to 18 inches in diameter, complete heat treating facilities including a 30 foot deep vertical atmosphere controlled furnace (necessary for the production of highly stressed strutting bolts); automatic duplicating lathes, automatic chucking lathes, qualified spot welding machines, complete qualified plating facilities including hard chrome, anodizing, cadmium, silver, copper, and dichromate (for magnesium), all types of grinding and boring machines, and the finest of inspection tools such as comparators and surface analyzers.

These facilities make Loud an outstanding source for major sub-assemblies of aircraft.

With this complete manufacturing facility in one plant Loud can produce major structural sub-assemblies. An assembly base for the production of tactical ground handling equipment is currently turning out jet engine cradles in large quantities.

► **Products**—Loud produces complicated structural fittings of both steel and dural, all types of machined parts—large and small, hydraulic cylinders, valves, hand pumps, servo-control mechanisms, pressure tanks, landing gear struts, nose wheel steering gear, pneumatic and fuel valves and filters, all of existing aircraft specifications.

► **Progressive**—Loud's modern manufacturing facilities are constantly being expanded to meet the



ONE OF THE LARGEST milling departments in the West contains thirty large mills, over 30 of which are of the hydraulic automatic duplicating type.

increased aircraft demands for quality and economy. This has resulted in the ability to produce precision machined products of the highest quality at a lower price than can be produced by the customer themselves.

"The tough jobs go to Loud" is indicative of the respect manufacturers have for Loud "know how."

► **Engineering and design development** by Haskell Engineering Associates, Glendale, California

► **National Sales and Service** by Heikel-Loud Aircraft Service Corp., Glendale, California

► **Resident Sales Engineers** located in Seattle, Wash.; Kansas City (Independence), Mo.; Baltimore, Md.

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540 E. 3rd Street, Dept. 10, Pomona, California

lowest the cheap, expendable system may have applications for ground use in model testing.

How It Works

Arnolds, which also makes wind tunnels and target drones (AW May 10, p. 55), got into the model test business in 1949. When Arnolds moved in 1949, said NACA, was taking various plants to bid on five flight models, the company asked for the drawings and passed in the bidding. Arnolds submitted what it believed was a very high bid.

The company quickly learned a pleasing lesson about the economics of model-building. Its bid for six models was \$16,400. Next closest bid was \$58,500.

"We got the business and made 100% profit," Crutcher says.

The company was a member of other NACA competitions. Then the whole bidding scene began to drop in NACA brought more and more companies into the competition. "Arnolds' bid was an NACA laboratory bid for some time now," the company's president admits.

From building models of NACA design the next step was into actual design work. Crutcher encouraged NACA that Arnolds itself have a design center.

"We put in an engineering department and we got started," Crutcher recalls. "We dropped \$10,000. But we learned how."

The company then decided to expand into testing so that it could integrate the whole package. A classified government contract got the firm into the testing end of the business and today Arnolds can offer complete design, manufacturing and testing facilities for rocket-propelled models.

In integrating the entire process, Arnolds believes it can offer a service in both how and money that no other manufacturer can match in this area.

"We are not worried about big airplane companies making this field because it doesn't make sense," says Crutcher. "It is ridiculous for a contractor to take on the problem of supplying its own low flight data when we can do it for less at low cost and in less time. He just doesn't have enough work to have a special department for this."

Arnolds, which has 65 employees, is looking forward to work of more \$250,000 in the first quarter of fiscal 1956. This is due largely to a contract the company has for radio-controlled target drones.

But as the industry probes deeper into supersonic flight Crutcher expects free flight testing of rocket-propelled models to play a bigger role in the company's future.

A companion for our famous ageable vertical gyro!



Honeywell has a new vertical gyro—simple, rugged and accurate!

Honeywell has developed a new non-geable vertical gyro, the GG13, designed to meet higher standards of ruggedness and accuracy than its famous predecessor—the JG7009, heart of the modern Honeywell Autopilot.

If your gyro needs don't call for buying (for that you'll want the Honeywell JG7009) you'll definitely want to investigate the business of the new Honeywell GG13.

This compact vertical reference gyro, with a pitch freedom of $\pm 60^\circ$ and a roll freedom of $\pm 165^\circ$ continuously is designed for precision control. The value of these parameters can be varied considerably to meet your particular application.

The specifications on the new Honeywell GG13 are detailed below. For further information, and for information on the full line of Honeywell Gyros, write to: Honeywell Auto Division, Dept. AW-7-112, Minneapolis 13, Minnesota.

Specifications of the new Honeywell GG13 Vertical Gyro

Power Requirements to Gyro Motor: 120 V., 600 CPS $\pm 10\%$, single phase, 100-watt motor, 30 V., 400 CPS, single phase.	Gyro Reference Time, Rate, (min):
Power Input: Gyro Motor 30 watts max. (continuous); 30 watts max. (starting).	Rotation Rate: 2" or 4" per min. (normal) (stop adjustment).
Reference Motor: 3 watts each.	Roll Rate: 11°/min. (max).
Gyro Speed: 12,000 rpm (max).	Accuracy: 0.15 degrees of one roll out in each axis.
Angular Misalignment: 4.15 $\pm 30^\circ$ per cent/sec.	Output: precision potentiometer signal.
Roll Axis Freedom: $\pm 165^\circ$ (max).	Weight: 3 lbs. max.
Roll Rate Freedom: $\pm 11^\circ$ (min).	Time for Single Rate Signal: 1 min. after application of power.
	Standards: Fully specified to MIL-T-2412.

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Admiral has built COMMUNICATIONS for a sky-ful of planes

Standard communications equipment for nearly all military aircraft is the famed AN/ARC-17. This compact, all-channel instantaneous receiver can be tuned to 1,750 VHF and UHF channels. Containing 26 tubes and upwards of 5,000 parts, this unit is being produced in vast quantities to keep pace with America's expanding air power. Approximately one out of every three instruments supplied to date has come out of Admiral plants.

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NEW SWISS P.16 GROUND-SUPPORT FIGHTER is a conventional plane with thin straight wing and swept variable-incidence tail.



CANON-ARMED P.16 was designed for operations from rugged Swiss terrain. It is powered by an Armstrong Siddeley Sapphire turbojet.



First Swiss-Built Jet Makes Initial Flight

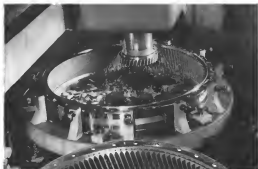
A thin straight wing of large area is the key design feature of the new Swiss PFA P.16 ground support fighter, which made its first flight Apr. 26. Powered by an Armstrong Siddeley Sapphire, the P.16 is intended for short field operations in mountainous Switzerland (AVR Jan. 5, p. 24, Apr. 25, p. 7).

Armament is a pair of 30-mm. Oerlikon 302 RK revolver cannons with a rate of fire up to 1,100 rounds per min. and a muzzle velocity of 1,600

fps. Extended stores, including rocket pods, add to its offensive punch.

The P.16 is the first Swiss-designed and built jet aircraft. Its development—PFA 4, PFA 5, PFA 6, PFA 7, PFA 8, PFA 9, PFA 10, PFA 11, PFA 12, PFA 13, PFA 14, PFA 15, PFA 16, PFA 17, PFA 18, PFA 19, PFA 20, PFA 21, PFA 22, PFA 23, PFA 24, PFA 25, PFA 26, PFA 27, PFA 28, PFA 29, PFA 30, PFA 31, PFA 32, PFA 33, PFA 34, PFA 35, PFA 36, PFA 37, PFA 38, PFA 39, PFA 40, PFA 41, PFA 42, PFA 43, PFA 44, PFA 45, PFA 46, PFA 47, PFA 48, PFA 49, PFA 50, PFA 51, PFA 52, PFA 53, PFA 54, PFA 55, PFA 56, PFA 57, PFA 58, PFA 59, PFA 60, PFA 61, PFA 62, PFA 63, PFA 64, PFA 65, PFA 66, PFA 67, PFA 68, PFA 69, PFA 70, PFA 71, PFA 72, PFA 73, PFA 74, PFA 75, PFA 76, PFA 77, PFA 78, PFA 79, PFA 80, PFA 81, PFA 82, PFA 83, PFA 84, PFA 85, PFA 86, PFA 87, PFA 88, PFA 89, PFA 90, PFA 91, PFA 92, PFA 93, PFA 94, PFA 95, PFA 96, PFA 97, PFA 98, PFA 99, PFA 100, PFA 101, PFA 102, PFA 103, PFA 104, PFA 105, PFA 106, PFA 107, PFA 108, PFA 109, PFA 110, PFA 111, PFA 112, PFA 113, PFA 114, PFA 115, PFA 116, PFA 117, PFA 118, PFA 119, PFA 120, PFA 121, PFA 122, PFA 123, PFA 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firm-to-standing, financial work done at the Santa Fe Institute of Technology's Institute of Aeronautics under Dr. Jacob Acher. His recent work has included the development of a thrust-reducer for helicopters and co-tractor experiments in border-line control, both desirable additions to an airplane that must operate from the 1,600 ft mountain strip common in Switzerland.

Observers believe the Swiss may try to sell the airplane to the new German Luftwaffe for its ground-support wings. They cite the former connection between FFA and Dornier plus the great desire of the design and production group.

USAF Contracts

Following is a list of recent contracts awarded in the United States Air Force:

Alcoa Instrument Corp., Lubbock, 1976, Servomotor for air, automatic engine control spare tools test data, 27 m, \$109,119.

Aviation General Corp., Ames, Calif., oil engine monitoring device with control and services for construction of pilot protection and protection surface protection for product, 100, 1000, 1000.

Aviation General Corp., Ames, Calif., oil engine monitoring and control device, 100, 1000, 1000.

Aviation General Corp., Ames, Calif., oil engine monitoring and control device, 100, 1000, 1000.

Aviation General Corp., Ames, Calif., oil engine monitoring and control device, 100, 1000, 1000.

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Nike Goes Into Action Quickly In Arctic Test

Arctic tests of the Nike surface-to-air missile system have proved the weapon can be put into action quickly in low-temperature environments.

In addition to weapon effectiveness, the tests were aimed at determining reliability of the units. Schedules included moving all equipment into and out of action preparing launching sites and machinery and determining the time and accuracy of checkout and of readiness on the radar gun.

Tests were made by 44 U. S. trained personnel from the Royal Canadian Air Force, assisted by a four-man unit of the Royal Canadian Electrical and Mechanical Engineers. Canadian and U. S. systems were present. Operations were controlled in Canada's sub-Arctic, a

few miles from Churchill, Manitoba. Operations began last November with Arctic introduction for the team, and elementary tests on the equipment. The team's test schedule began each day and was completed in March. Acceptance of the results was withheld until recently because of security.

Canadian sources say radar trackers and computers worked well in the intense cold and that launchers and missiles could be put into action quickly.

Permanent Seminar On Plastic Tooling

A permanent seminar on plastic tooling has been established at the Naval Air Station of Training, Edgartown, Mass.

Three permanent classroom standards, and extended—see, effect at area var-

ing down \$300 per day for the complete extended course to \$20 per day for the extended.

The classroom course, four days long, is aimed at providing basic working knowledge on the use of plastics in tooling. The standard course follows for five days, and covers advanced training and specific applications of plastic tooling.

The extended course is planned for manufacturers and engineers who need long-range assistance in setting up large tooling programs, or who want to prepare for a career in the field.

Degree Offered to Nuclear Engineers

A two-semester nuclear engineering course, leading to a master's degree, is being offered by the University of California at Berkeley.

Emphasis will be on nuclear power reactors, with studies in safety, design, performance, production and cost. Weekly seminar sessions will supply most of the program, and will feature outside speakers of the caliber of Drs. E. Teller, E. O. Lawrence, and H. F. York. The center at Lawrence—University of California Radiation Laboratory—will be used during the program.

Prerequisites for the course is a completed curriculum in engineering in physics. The faculty administrator Prof. E. O. Lawrence, Chairman of Mechanical Engineering, University of California, Berkeley, Calif.

AF To Link Defense Units by Leased Lines

A \$2 billion project to speed the U. S. air defense command system has been started by the Air Force. SACIS—State Automatic Control Information System—designed to replace the manually operated system now in use to link radar stations to control points, fighter units and guided missile batteries. It will include, in addition, the leasing of private equipment from telephone companies at an annual cost of about \$240 million. First details of the generally secret program were disclosed in hearings before the Defense Subcommittee of the Senate Appropriations Committee.

USAF program calls for the telephone companies to install the rapid signal and lines to the Air Force with the cost to be paid off over a 10-year agreement. SACIS system will require about 25,000 circuits at a great 1,900 each in the present system.

The SACIS system will operate only in emergency situations and will not be extended to the DEW—Distant Early Warning—line.

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In the way, Link helps the ADC pilot and radarman develop a working relationship with each other and with the mighty instrument of culture they will operate, Link helps them to work more efficiently, more effectively, in guarding America.



Prising the ship between four walls, the Link F-4D Jet Flight Simulator, developed under Link's patents, duplicates precisely the flight and radar characteristics of the Phantom.

LINK DIVIDES APPLICATIONS WITH COALITION ENGINEERS AND CRAFTSMEN



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22-94, 22



NAA F-86H can double as a fighter-bomber or air superiority fighter, has "special weapons" capability.

Nellis Air Force Base reports:

"G.E.-POWERED F-86H HAS CLIMB RATE DOUBLE THAT OF THE F-86F"

Newest J73 jet engines have 50% more power in same frame size as J47 models

Just how fast the F-86H Sabre can climb was, until recently, undisclosed. But at Nellis AFB last January, the true potential of Tactical Air Command's "40" Sabre and its G.E. J73 engine was revealed. An Air Force report stated:

"To compare the climb rate of the new F-86H (J73-GE-3 engine) with that of the F-86F (J47-GE-7 engine), we began by flying the 'H' at 3000 feet and its F-86F at 30,000 feet."

"Both planes were put into 'maximum climb' simultaneously. At 30,000 feet, the F-86H overtook and passed the 'F'. When the 'F' reached 30,000, the 'H' was at 40,000. At the end of the test, the 'H' was

climbing at twice the rate of the 'F'. All told, the F-86H went up 37,000 feet in the same time it took the 'F' to travel 19,000."

Need? Yes—but not to North American Aviation and General Electric jet engineers. The 1960 to 1961 J73, 50% more powerful than the combat-proved J47, promises well as an operational F-86H engine. F-86H take-off distances are less, shorter runways can be used, all-around performance is improved over previous Sabre models.

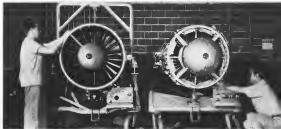
General Electric progress in jet engine design is continuous. It is now—today—playing off its another advanced high-thrust engine, soon to power supersonic military aircraft.



J73 CANNULAR COMBUSTION SYSTEM is significant advance from J47's. It increases burning efficiency and structural rigidity, while saving weight.



J73 ACCESSORIES—To simplify inspection and maintenance, J73 fuel pump, and gear assemblies are mounted beneath engine.



J73 FRONTAL AREA. Diameter of J73 (left) and J47 is about the same, but J73 has greater air intake area which allows more airflow through engine. Exposed J73 inlet vanes are anti-icing.

OPERATIONAL SERVICE TESTS on G.E. J73's show high reliability, low maintenance equal to G.E.'s famous combat-proved J47. J73 engines are rapidly accumulating flight time in the NAA F-86H.



Progress Is Our Most Important Product

GENERAL  ELECTRIC

Anti-Radiation Additive for Rubber

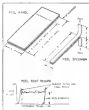
Early progress in extending the life of synthetic rubber in atomic radiation has been reported by the B. F. Goodrich Research Center, Brecksville, Ohio. Materials called "anti-rads" have been developed to add to rubber stocks in process before vulcanization. Rubber products made from the processed stock will have a life expectancy in the presence of radiation about 10 times that of unsupplied rubber.

Severe tests have been made with treated rubber in a cobalt-60 source placed at the specimen center.

Peel Test Checks Metal Adhesive

A new peel test for metal-bonding adhesives is being used by Douglas Aircraft Co., Santa Monica, Calif.

Adhesives to be tested are bonded to 4.817 gage and 2.6511 diameter alloy in 5/16-in. panels. These panels are bonded in a 6/7-in. area, leaving a 1-in. long unbonded portion at one end. The panels are then stressed at 1 in. within and the unbonded ends bent to bend at opposite directions perpendicular to the plane of the bond.



During the test, the two 3-in. long unbonded ends of the test panel are gripped in the jaws of a 5,000-lb. capacity, autographic, universal testing machine. Uniaxial testing machine reads in. Baldwin-Laudman Corp. The specimen is pulled apart at a specimen rate of 2 ipm, separating the bond at 1 ipm.

The test record gives average peel strength in pounds per inch width of the specimen. Type of failure and average adhesive film thickness can also be observed from the test result.

THRUST & DRAG

Remember Cosmo Meade thus when adults earlier invented the airplane? His 10th birthday is coming up soon (he's still living, by the way—how many derivations are?) and the Russians are making big deal of it all. First, they plan to erect a bronze bust at Krasnoe Selo near Leningrad, where the first aircraft was built and flight-tested in the summer of 1882.

Second, the Red Banner Air Force Engineering Academy in Leningrad is being renamed after Meade.

But poor Cosmo Meade never knew all this post-mortem glory that was to be his, nor did he ever get one medal for his invention. Not for him was the Order of Lenin or a Hero of Socialist Labor decoration.

Thus, the honor was without praise to his own country.

It also was as important to many engineers as the sales, they agree (as does not record). Two or three cuts made after war's ending are worth something to him although unimportant and he does not agree on the cost aspect.

But how deplorable is the trend to lightly tell. It is bad enough to have to write to an Assistant Chief Develop-



You Have to Crawl Before You Fly

On any new design you have to do a lot of crawling—through research, development and design—before your plans can fly.

It is in these early stages of design that Shafer Bearing Engineers have helped development of many of today's newest babies in the air. Shafer specializes in bearing design, plus the inherent flexibility of Shafer

design, has saved valuable engineering time . . . saved space and weight in the finished design . . . and saved time and expense in production man-hours.

Call, wire or write: Shafer Aircraft Bearing Division, 801 Burlington Ave., Downers Grove, Illinois. In the meantime, write for new full-color catalog No. 54.



Gen'Vex Design—10' plus or more self-aligning always available . . . Easy lubrication without disassembly . . . High radial and thrust load capacity . . . Excessional shock load reserve strength.

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NEWEST METHOD OF SEALING AGAINST MOISTURE

POTTING of Cannon Connectors

FOR...1. Positive sealing against moisture, dirt, and other foreign matter.

2. Weight saving because of elimination of end bell and cable clamp.

3. Space saving due to shorter overall length.

4. Prevention of wire fatigue under extreme vibration.

5. Improved dielectric characteristics.



Typical completed potted connector

Indurated wires and shields are thoroughly sealed



CANNON offers these Connectors for Potting

- CAD485 Plug • Plastic Inserts 125 to 48 Sizes
- CAD485 Plug • Plastic Inserts 125 to 48 Sizes
- CAD485 Plug • Resilient Inserts 85 to 26 Sizes
- CAD485 Plug • Resilient Inserts 85 to 26 Sizes
- CAD485 Plug • Plastic Inserts 125 to 48 Sizes*
- CAD485 Plug • Resilient Inserts 85 to 26 Sizes*
- CAD485 Plug • Resilient Inserts 85 to 26 Sizes*

*See drawing

Receptacles also available for potting.

Plugs and receptacles available with either pin or socket assemblies.

Also note: Many other connectors may be potted by drawing proper potting instructions.

CANNON Potting Molds



Pin potting mold

Socket and ball

or a few gas. However, the flow gun is the preferred method where larger quantities of the plugs are to be sealed. Methods are discussed fully in the new Cannon Manual on Potting.

Potting Machines...

Large quantity runs can be handled economically by potting machines. Typical equipment of this nature is illustrated here.



Potting by hand



Curing Time...

Curing time and the methods used are very important. The length of time that it takes for the sealant to harden and cure varies with the material used. Generally, the length of cure time depends upon the work life of the compound. A longer work life increases and short work life decreases the cure period. See the new Cannon Potting Manual for complete details.

MIL-D-3886 (Aer) is basic specification on sealing compounds for electronic assemblies and electric systems. DuPont Bulletin, *dur-K-10* covers electric connector sealing to prevent contamination, improve reliability.

DuPont's engineering assistance is available to you on your potting unit. Write TERRY for assistance and for new 10 page, *Sealer, Potting Manual* No. PH-1.



Phone mention this magazine or Dept. 100

CANNON PLUGS

CANNON PLUGS (Aer) - 2000 Models in 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

most Engineer (Aircraft), but here's a warning: One original design to it is Atomic Sub-Section Group Leader, Thermodynamics, Fluid Flow and Heat Transfer, Rocket Section, Engineering Department. He's happy but he's going to lose a lot of his correspondents.

Bonnie: it has been pointed out, stands for a master system named after Boeing (Bo) and Michigan Agricultural Research Center (MARC). Mine now is the Wilcox Ray Research Center of the University of Michigan (WVRC), but it seems will tell you, Bonnie is lost contact to see them Bonuses.

Also, in the way, was one of the first primary manufacturers, and did early work on Project Wizard, an air-aircraft missile. Positive contribution from Wizard, led to the pioneering work done by Boeing on G-40 (which was set back by a number of years in a particularly dispute between services), have been combined in Bonnie Program and everybody familiar with the project has been satisfactory.

This delightful about composition is a grouping of abstract hand, legs from Kaiser Aluminum & Chemical Corp. The picture typifies industrial



at its magnificent best. For making a little point out of a user's eye, the Graphic Arts Dept. of Kaiser gets the Minimum Left Coast out of the Work.

Unseasoned earth satellites some nature, says Prof. F. E. Sander, who runs a seminar course on the subject at MIT. Sander told the American Rocket Society the value of scientific data to be obtained in such as to some velocity will be high. And the cost? Comparable to that of an important aircraft research program. Many vehicles are further off, he says—DAA



Boeing is now producing the Boeing 707-400, the Boeing 707-400, and Lockheed Aircraft Corp.



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LETTERS

Aviation Week addresses the problems of its readers on the pages found in the magazine's editorial columns. Address letters to the Editor, Aviation Week, 3300 W. 42 St., New York 26, N. Y. Try to keep letters under 500 words and give a general identification. We will not print anonymous letters, but names of writers will be withheld on request.

Airminded Youth

Barclay Schooner of McDonnell Aircraft drew a cold print in his kitchen from one letter page May 18 ("Model Began to Pop").

Young men designing and building model airplanes, competing in air meets that require skill and ingenuity, are a valuable asset to the nation's aeronautical industry.

While Roy McQuay is a brilliant example, there are hundreds. The budding competition develops a certain "aeronauts do" attitude that is exclusive and not as casual as any other sport.

At the moment, the National Championships Model Airplane Meet is being organized for the Los Angeles NAE Club by Academy of Model Aeronautics, a national organization made up of the national sport nationwide model makers. To finance prize events the Academy had to beg \$100 donations from small manufacturers of parts and supplies required by modelers.

This has been going on for years. It's more that aircraft makers like Boeing, Grumman, North American, Douglas, Northrop, McDonnell, General, Republic, Bell, United, Chance Vought, and others have ignored the great possibilities for an emerging aeronautical talent by sponsoring the Nationals.

Or if they're not interested in developing talent in this field perhaps they should look more toward attempts to perform a profitable public service. Setting up the Nationals at the target for America's air-minded youth put in gas, then a review run and keep them here would be great fuel burning. Especially since so much of the aircraft industry's income comes from the pockets of the average American citizen. The model airplane activity is now the nation's No. 1 hobby.

CHARLES TRACY
Senior Editor
The Cleveland Press
Cleveland, Ohio

Airplanes & Alcohol

Page 127 of your June 6 issue is devoted to a report on what the West Coast airlines are doing to attract extra business. These personnel actions have decided that booze is the key segment.

It may come as a shock to these airlines, and others throughout the country, that there is a large group of air travelers who must be kept sober in a small cabin with a group of people whose planes are kept full from the time the plane is refueled until touchdown. When there are unlimited quantities of beer before there is always someone in the group who gets ebriation.

You report that "UAL would prefer not to serve free alcoholic beverages" and that President William H. Patterson is against serving airplanes and alcohol." So this is not it. The question still is more important than principle.

From an operational standpoint there are three points to consider when serving liquor: 1) safety, 2) inconvenience and 3) cost.

As air travel safety is the number one consideration in let's forget points one and two. Are we going to live in a seat and some marketing character decides that he is going to show the pilot how to land the plane at a crucial time in an instrument approach before someone decides that airplanes and liquor don't mix? Cutting enough the "lucky" cases due to the flight cabin is no problem if a person is determined to do it.

Are you a drinker? Try to get someone to get there when told on after they're had a "free bar none?"

There's that's the way you who decides it would be a big laugh to put the handle on the emergency door at 10,000 feet.

There are some of the many other things that can go wrong. The result of all possibilities would be a long list.

Another UAL official explains that "We don't want our shareholders to become litigious." What the hell else are they if they have to keep 95% of their passengers' glasses filled at all times?

It might be handy to suggest that the stewardesses visit flight instructors, black shirts, high heels and white bunny suits to keep in style with their new jobs. They'll also be better able to do better when some of their most anxious passengers start pouring and mistaking them in search of a little high altitude diversion.

It seems almost that on the one hand the airlines are trying to build their business with special low rates on certain days and on the other hand they are capitalizing on the fact that the old typical women and children, a man who thinks twice before he loads his wife and children onto a flying fortress filled with right smoke and happy cabin attendants.

It has always amazed me how many men don't travel by air because their wives don't want them to. Will guaranteeing a wife and her children will be drunk before he reaches his destination help the public relations problem?

People tend to fly air because they want to get somewhere quickly and comfortably if possible. They don't want to be in line much less know they will get it. I sincerely doubt that there are many people who would feel that life has passed them by if they didn't have a glass of fine wine in their hand all the way from Chicago to New York.

I suppose that the airlines that serve liquor have associated their decision to the point where they feel that no trouble will result from their action and that it maintains business. If a few more people thought that the first airline to get into trouble because of liquor would lose their

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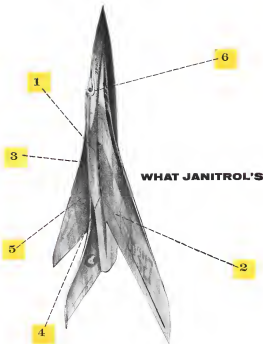


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




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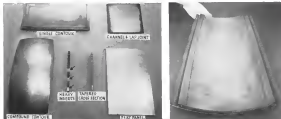
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TYPICAL 17-7PH STAINLESS STEEL honeycomb panel fabricated by Rohr includes desiccant-lined panel development shown at right

Rohr Develops Stainless Steel Honeycomb Structure Knowhow

By Irving Stone

Charles Vada, Chief—An intensive development program on all-metal honeycomb stainless steel structures is being pushed by Rohr Aircraft Corp.

Though far removed from Rohr's established activities in power packages and airframe and component fabricating, this work is considered necessary by the company's engineering plan men to anticipate design thinking of prime contractors and be ready for the mounting demands of production ready design will entail.

Rohr wants to build up a big store of knowledge for the day when aluminum honeycomb structures will be approaching routine use.

There is a trend toward all-metal honeycomb structures in many new designs of aircraft and missiles entering the market.

It would provide high strength-weight material that retains its properties in face of aerodynamic heating and propulsive blast of future military vehicles. It would offer lighter weight to meet the design requirements that would normally be connected with this conventional items subjected to upstream flight.

Industry engineers feel that the all-metal honeycomb structure may be the next progression after conventional is known also, develop needs temperature and design knowledge. The honeycomb coatings may be all stainless, may even

include titanium alloy in part. One of Rohr's projects is to develop:

- Manufacturing techniques leading to a production shop
- Engineering facilities to permit airframe builders to achieve all-metal honeycomb structure efficiently in their design. Rohr engineers believe that the

processor of these structures will have to supply design criteria to the prime contractor. This is because detail designs will have to be laid in manufacturing techniques pretty much to a specific point to permit heat. Rohr's present developments in all-metal honeycomb's outlook is in components of actual components established by surface examination for design effort in production or in preliminary design stages.

Some of these items:

- Wing and control surfaces in region of jet blast
- Hot ducts
- Jet pod cowling, strut slats and fuselage
- Jet engine shrouds, serving or heat barrier, in boost installation
- Aerodynamic sections of missiles. Future high Mach-number aircraft may also use the material to counteract effects of aerodynamic heating.

Due to the prime contractors' all-metal honeycomb structures, is the best method for cowling (ditching) the core, skin and edge components.

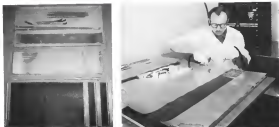
Preliminary investigation at Rohr has shown that a variety of methods are feasible including:

- Fusion welding
- Induction heating
- Resistance welding

For heat treating, Rohr engineers believe they will use an extremely simple approach for performing these structures to meet present-day production of airframe builders.

This doesn't mean that induction heating or resistance welding is ruled out in Rohr's development thinking.

At the point in the development program Rohr is fusion welding using dry hydrogen atmosphere, no flux, and



COMPONENT PARTS of the all-metal panel with heavy lag inserts (left hand picture, lower right) to take concentrated loads. Shape in lower ribbon. Operator in right-hand photo is tacking ribbon in place during layout of tapered flat panel with heavy inserts.

heating alloys with melting tungsten, burn in the range of 1,700-1,800° (to meet operating temperatures as high as 1,800°).

The no-flux condition is considered superior.

Rohr engineers point out that a structure based with flux is subject to corrosion in the presence of moisture if all the flux has not been removed—and this complete removal isn't practical because this type of honeycomb structure does not lend itself to use of a protective coating, and also because there is an opportunity for internal inspection, Rohr has added it heat to eliminate the flux to yield wet corrosion.

Research and development is going ahead on heating alloys with melting temperatures in the order of 1,800° to meet the material's operational limit to perhaps as high as 1,800°.

Tooling Design

The higher temperature heating stage brings renewed problems of maintaining dimensional control on large panels and reproduces additional difficulties in manufacturing techniques.

Thus, tooling, a controlling factor in the successful production of the all-metal honeycomb structure, must meet these requirements:

- Maintain dimensional accuracy under the firing (heating) temperature conditions
- Be light and built to permit application of steady controlled heat to the heated metal
- Have a reasonable life, in the face of the best conditions, for production runs.

Through use of high-temperature tooling materials and a unique tooling design configuration, Rohr has met



HONEYCOMB PANEL supports panel truck in demonstration of strength and rigidity.

these precise loading requirements in a practical manner.

Non-Destructive Tests

Development of non-destructive testing techniques for production aircraft is another prime objective in the all-steel heavy-duty aircraft program, the company points out.

Rehr is using stress in its approach to the problem. It has devised a remote vibration arrangement consisting of audio amplifiers and a probe. As an indicator, Rehr uses either an oscilloscope or meter, but prefers the meter since the oscilloscope is a laboratory instrument.

The probe is run along the surface of the semicircular structure. A visual sign of reflection is the amount of beam material given a higher indication on the meter as a result of change in material frequency response.

This device now has been developed to the point where it possesses a portable non-destructive inspection check for various conditions of beam defects, not only at hot joints but in compressed transverse configurations as well. Rehr technicians find.

Next phase is usually concerned with the calibration of the inspection system. This involves a program of correlating instrument readings with known defects

in samples serving as "standard" check pieces.

Materials

Rehr's development work on the overall program was in contrast aimed at the use of 15.5 steelhead and stainless steel structural steel forgings and not for non-structural applications such as engine structural and fittings.

Where lighter strength is required, such as in engine structural and engine cooling and about skins, 17-7PH heat treatable stainless steel forgings and cast are also used.

Combinations of 17-7PH cast and 15.5 forgings also have been utilized by Rehr engineers.

Plating thicknesses vary from .002 to .004 in combination with one material plate of .0015, with cell size varying from 1 to 4 in. square. These combinations have been included in the development program primarily because the design Rehr has under consideration demands them. Other combinations of skin and core also could be used at discretion.

The program has included all the basic configurations in which the honeycomb structure could be applied, such as flat panel of constant thickness, single and double constant panels of constant thickness, and tapered panels.

Process processing equipment at Rehr will accommodate curved panels of approximately 50.5 ft. with 1.5 ft. depth of maximum curvature, on a development basis. Equipment now being installed will boost that size to about 5 x 12 ft. x 5 ft. deep.

PRODUCTION BRIEFING

► **Mohler semi-conductor** 1,000-h vacuum melting furnace installed in Chrysler Dept. of General Electric Co., Detroit, with better than 130,000 lb capacity of installed vacuum melted alloys to U. S. capacity. Unit was supplied by Consolidated Vacuum Corp., Rochester, N. Y. Similar equipment now recently installed in Westinghouse Electric Co. (AW Apr. 4, p. 62).

► **Sullivan Rehrer Co.**, Los Angeles, Calif., has qualified as an approved source for AN 6700 Q-ring gaskets for USAF aircraft hydraulic and pneumatic systems. Firm's compound SR 510B-90 has just qualification trials at Wright Air Development Center.

► **Gilson Refrigerator Co.'s** Special Products Division, Greenview, Mich., has delivered its 30,000th 165-jet engine component, a combustion chamber assembly. It now makes tools for Carter-Wright and Ford's Aircraft Engine Division.

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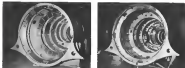
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EXPERIMENTAL ALL-MAGNESIUM F-8C took out its first flight at Mitchell AFB. Aircraft was designed and built by East Coast Aircrafts for exhibition in AECG.



CONSTRUCTION SIMPLIFICATION made possible by use of magnesium. It shows in cross-section of these two front fuselage sections, magnesium is at left; aluminum at right.

Magnesium F-80 Heads for WADC

All-magnesium F-80C Shooting Star, built for Air Force to demonstrate the feasibility of using the light metal for primary aircraft structure, recently completed its maiden flight at Mitchell AFB, N. Y., and was later evaluated tests at Wright Patterson AFB, Ohio.

The plane was designed and manufactured by East Coast Aircrafts, Peconic, N. Y., for the Air Research and Development Command (ARDC) Sept. 25, 1955, p. 281. It took three years from initial design to rollout, including one year for fabrication.

Approximately 1,000 lb. of magnesium sheet and extrusions went into the F-80C. The plane's weight is comparable to that of a standard aluminum F-80.

The aircraft's structure is more rigid than that of its aluminum counterpart. This is because the plane is considerably heavier in the plane made of the lighter metal. Where Lockheed uses 0.51 skin with multiple stiffeners, ECA uses 2 in. magnesium structure with no stiffeners. Results are approximately 30% reduction in weight. This means a less expensive, faster-built aircraft with smoother external surface.

Although magnesium costs about 30% more than aluminum, the finished magnesium plane costs about 25% less than a conventional ship-on material aircraft for only about 1% of a plane's

cost, says ECA, and the alloy weighs more than other magnesium's higher price.

The company estimates its F-80 will be 110 mph faster than a standard ship, because of its smoother than 0.015 in. thick magnesium wings are stiffer on a conventional F-80 measured the plane's speed 5 mph.

Magnesium is more susceptible to fatigue than aluminum, but J. F. D. Gages, ECA's vice president engineering, believes the experimental plane will be less prone to this type of failure than aluminum F-80s, because of its thicker skinning and rigidity.

Thermal expansion of magnesium is somewhat about the same as aluminum. Strength loss starts at about 270°F, but a new magnesium alloy, already available in many parts, says this to about 600°F, according to Gages.

Air Force Secretary Harold G. Brown flew to Mitchell to inspect the all-magnesium fighter and see if its first demonstration flight for the plane was delayed 30 hours in three successive malfunctions.

First the right wing tip tank release released because insensitive. This a help-out test was shown up a spring right back. When the tank had been ejected, a welded release cut the plane's electrical system out of commission, canceling the flight for the day.

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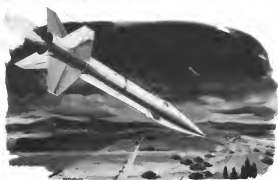
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ance system, and designed to supplement artillery in the medium to heavy range. Honest John is extremely accurate, moves quickly into position on a spread track, which also serves as transport and launcher. Highly accurate, this rocket can handle either an atomic warhead, or a single high explosive round resulting

in an explosion force of hundreds of tons of artillery shells.

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AVIATION CALENDAR

- July 18-22—Special aviation program on Announcements of Unusually Fine, Alaska Classics Institute of Technology, Colorado Springs.
- July 18-24—Western Fleet Maintenance and Engineering Show, sponsored by Clegg and Poirier, San Pacific Automobiles, Los Angeles.
- July 18-24—Philadelphia Glider Council, annual open house, Philadelphia Glider Club, 1225 Locust, Pa.
- July 17-28—Rotterdam Helicopter Congress, Rotterdam, The Netherlands.
- Aug. 1-5—European Aircraft Show, first annual Fly-In and Convention, Central Wright Airport, Milwaukee.
- Aug. 5-10—Institute of the Aeronautical Sciences, annual National Aviation Forum for Transportation Meeting, Olympic Hotel, Seattle.
- Aug. 20-24—Los Angeles Area Convention and Airport Personnel, San Francisco.
- Aug. 18-27—Security of Instrument, Taglines, West Coast Golden Anniversary Meeting, Hotel Malmonde, Portland, Ore.
- Aug. 22-27—Symposium on Electronics in Aircraft Production, sponsored by Stanford Research Institute and the National Industrial Conference Board, Sheraton-Palace Hotel, San Francisco.
- Aug. 26-28—Western Electronic Show and Convention (WESTCON), Civic Auditorium and Fairmont Hotel, San Francisco.
- Aug. 24-28—International Aviation Council, conducted by Seattle Chapter of Boeing Aviation Corp., Seattle, N.Y.
- Sept. 1-4—Twenty-sixth National Airshow Show, Philadelphia International Airport.
- Sept. 1-5—Aviation Division of Flight Test, eighth annual Research Flight Clinic, New York to Romeville.
- Sept. 12-16—Institute of the Society of Aeronautics, 10th annual Conference and Exhibit, Slingshot Exposition Hall and Auditorium, Los Angeles.
- Sept. 17—Institute of Radio Engineers, Symposium on Automation, Radio Engineers, Los Angeles.
- Sept. 20-24—Aviation Institute of Electronic Engineers and Institute of Radio Engineers, 1955 National Electronic Conference, Park Sheraton Hotel, Detroit.
- Oct. 1-5—Eleventh annual National Electronic Conference, Hotel Sherman, Chicago.
- Oct. 4-6—Eleventh annual Aircraft Space Flight and Space Conference, sponsored by Quapaw Space Flight Co., Sioux Falls, S.D.
- Oct. 17—National Business Aircraft Show, eighth annual Meeting and Forum, Sheraton-Cadillac Hotel, Detroit, Mich.
- Oct. 18-19—National Aeronautics Council, sponsored by American Association of Airport Executives and University of Illinois, Normal, Ill.
- Oct. 18-19—California-Aeronautics Association, Aircraft Production Forum and Aircraft Engineering Display, Hotel Sheraton, Los Angeles, Calif.
- Oct. 18-19—International Air Transport Union, 17th annual General Assembly, Waldorf Astoria Hotel, New York, N.Y.

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NEW AVIATION PRODUCTS



Non-Gaging Gyro Weighs 4.5 Lb.

Low-cost, non-gaging, vertical gyroscopes weigh 4.5 lb., run 500 to 1000 vibrations at 15 cps. and have an accuracy of 0.15 deg. of true vertical in each view. The manufacturer reports. Drift rate is said to be less than 0.1 deg./min. and angular measurement is 475 x HP (cm/cm/sec).

The unit features a 2 to 6 deg./min. friction-free clockwise rate and requires only 1 sec. to reach a stable speed. Pitch freedom is 0.15 deg. and roll freedom is 0.167 deg.

Aerometrical Division, Minneapolis-Honeywell Regulator Co., 2800 Ridgeway Rd., Minneapolis 13, Minn.

Lock Bucking for Soft Metals

New self-locking vibrationproof bucking is designed for use with relatively soft materials such as aluminum, magnesium, mild steel and some plastics.

The bucking, which provides a self-locking blind fastening, is available in two forms: type N7-174, with no blind locking device, is good up to 2500; type L12-174, with blind locking device, is good up to 5500.

Replacement buckings do not have to be over-torque because socket threads can be removed with a strong tool to accept a new bucking of the same size, the maker says. Also, because of the external method of locking provided by the bucking design, less hoop stress is created in a casting allowing smaller coils, detenters and a reduction in bearing wear.



Type 2824 buckings can be used in any material whose hardness is less than Rc 25 by tapping a hole with a Class 2, unthreaded, non-tap. Drills are easily removed with a standard screw (a torque tool). Buckings have been replaced in more than 10 times without appreciable loss of axial locking torque, it is claimed.

Units are available in three internal thread sizes: 10-32, 1/8, 3/4 and #24.

Electric Shop-Nut Corp. of America, Union, N. J.



Blower Raises Pressure

Model 100 blower uses a 5-in. diameter rotor to deliver high pressure air through speeds to 75,000 rpm, with the rotor delivering a pressure rise of about 65-in. of water static head at sea level. Static efficiency is better than 75% from the hydraulic energy input to static pressure rise output, the manufacturer claims.

The unit supplies 22 lb. of air per minute at a static head rise of 20 in. at 20,000 ft. altitude pressure and 2000 rpm. Temperature: blower is 15 in. high and 5 1/2 in. wide at the mounting flange. Weight is 15 lb.

Ferguson Research Corp., 1600 Franklin, Santa Monica, Calif.

Small Timer for Missile Use

Designed specifically for installation in missile or airborne equipment, small timer provides maximum time delays from 1 sec. to 6 min. in the various models.

Unit contains a spring wound timer



and a single pole double throw switch. Three actuators are available: full size double (typical) center or G-mount (flexible).

Switch is rated at 5 amp., 250 v., non-inductive. Operation can be initiated out to 40 G., -600 to 2000 with a 0.10% accuracy; it is stated by the manufacturer.

Removal Engineering Laboratory, Middletown, Conn.

Potentiometers Weigh 0.8 Gm.

Self-restoring precision potentiometers weighing 0.8 gm. and with 150 diameter are designed to combine the features of larger units. Units are planned for computers, transmitters, guidance systems, portable and aircraft equipment.

Some C-105 potentiometers have



multiple finger contact brushes, gold connections and 300-ohm electrical to turn. Units can be ganged and independently phased.

Electronic Sales Division, Defense Corp., 4501 Nathan Blvd., Long Island City 3, N. Y.

Tach Generators Work at 4500

New tachometer generators can operate at ambient temperatures of 4500, the maker reports. The units feature a permanent magnet type assembly with brushless design, having Teflon-impregnated magnet core, high-temperature materials in electric connection and gears having 5210 to -900° temp. range. The gears provide back-drive at 1 in. 10. Sixteen torque.

Designed J6014 tach generator has two-pole three-phase output meeting



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Orenda's power the high performance Canadair Sabre J-6 in over Europe

Squadron of their all-weather interceptor Avro CF-100 is well over in service in Canada.

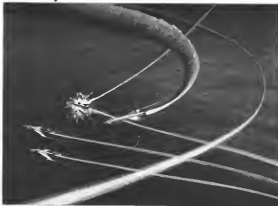


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In the interests of national security, this program is naturally classified but we can say this much: we are working closely with Canadian government research agencies, in the advanced technological fields of design, development and construction of guided missiles. We have produced missile airframes and control equipment — have seen them through actual firing tests.

This is a challenging field, where Canadian engineers face and overcome new problems every day. In missile development, as in other fields of aeronautical achievement, people who know say, "you can count on Canada."



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MIL-G-9998 Output at 4,200 gpm with a recommended load of 40-ohm resistors is 21 v. Minimum output at 300 gpm with a recommended load of 20-ohm resistors is 5 v. Units weigh 1.5 lb. and measure approximately 4x2.5x1 in.



Pallet Booth Travels 25 Fpm.

Traveling pallet booth that moves 25 fpm. needs less than one-third the total power used for hydraulic media wash, air blast and cabinet. Also, only 12,000 cu. ft. of air per minute are required, compared with about 10 times that much used in a stationary booth, it is reported.

The unit has been put into operation at Boeing Airplane Co.'s Wichita plant, where it cleans wing skins and spar chords for the B-47 and B-52.

Power units, air compressors and exhaust systems are self-contained in addition to 75-lb. CO₂ atmosphere for protection bottles. Price of the booth about \$15,000 installed.

De Villiers Co., Toledo, Ohio.

Tape Recorders Gather Flight Data

Series 800 airborne magnetic tape recorder uses lightweight shock-resistant component that can handle three

two channels of data on 1-in. tape. It 25 tracks on 2-in. tape. Plugs amplifiers permit recording data in FM, AM or PWM (pulse width modulation) form, as desired.

The remote control unit that initiates and stops recording also receives quantity of control tape and fits into the palm of a hand, it is reported. Power to operate is 400-cycle, 115 v., a.c. and 27 v., d.c.

An example of the unit's size: the five pieces of equipment required to tape five channels occupy 2.5 cu. ft. and weigh 55.5 lb.

Instrumentation Electronics, Aspen, Colo., 934 Chastain St., Redwood City, Calif.

Large Parts Degreased Fast

New series of electric, gas-free steam heated, heavy-duty degreasers has a double soap use confirms the better element which both the solution, the other takes the contaminated solvent and has a removable pan. The pan can be cleaned and changed and replaced with new soap when necessary in work.

Units come in four different sizes to handle loads of 4,000 lb. to 12,000 lb. per hour.

Harleys Manufacturing Co., 3415 W. Touhy Ave., Chicago 47, Ill.

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ALSO ON THE MARKET



General purpose adhesive. Also of low modulus, it is used to bond, repair, and seal. It has a strength of 40 lb/in. in pull and tensile shear of over 2,000 psi. It is a V.I. 100. It can be used with skin. Curing cycle is 200°F for 10 min. with 10 psi pressure. **Rohrer & Adhesives Corp., Bloomfield, N. J.**

Electronic level and flow control instrument comes in three versions: **Electronic Ticker, Differential Ticker, and Imbedded Ticker.** First unit has all digital circuitry giving close tolerance control and allowing one length conductor table, second version gives environment level control where high and low level differential is to be maintained, third model is applicable to situations where span between high and low levels is about 5 ft. **Radco Instrument Division, Radco Instrument Corp., 2020 N. Tenth St., Milwaukee 18, Wis.**

Tool graders range from 6 in. to 14 in. wheels. All are double-end models with reversible motors. **Ex-Cel O Corp., Detroit, Mich.**

Universal base can handle work up to 4 in. in diameter and long to 6 in. It can be run by hand or power. **Atlantic Instrument Corp., 40 Broadview, Norwood, Mass.**

Low-Elasticity is an adjustable level measuring device used for surface leveling and slabs. **Vibration** measuring device will not pack down and is unaffected by oil or chemicals. **Karlens Co., Inc., 4501 D 33d Place, Long Island City, N. Y.**

DeQuik featured interlocking cross-section allows construction of roofs of any desired shape or contour, the ruler supports. Sections are low-control cross-section interlocking long-life products in place of bars. **De Quik Lamp Corp., Industrial Division, Greenburg, Ind.**

Telescope microscopes from 1142 in. range to 1040 in. range. **Telescope** measuring coordinates to 0.001 in. angles to 1 min. of arc. **Units** can be used by anyone who can read a micrometer, the

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Fuel Meter Shows Flow and Quantity

By George L. Christian

A new gravimetric flowmeter being installed on a topjet bomber and fighter can do two jobs. It gives flow readings in pounds per hour, or, as an integrating unit, acts as a fuel quantity gage. It is being used as a flowmeter in the bomber and as a fuel gage in the fighter.

The flowmeter has a range of 0-100-000 lb./hr. Among its features:

- Accuracy of $\pm 1\%$ of indicated values is obtained at low fuel flows. This range is $\pm 1\%$ at intake fuel flow of 3,700 lb./hr./engine. A scale-change mechanism incorporating a solenoid-operated clutch is used to maintain accuracy over very wide fuel flow ranges.

The builder's designers consider the fuel flowmeter as a primary engine-instrument and demand corresponding accuracy.

- Pressure drop of the instrument is 0.7

psi at a flow of 40,000 lb./hr. and approximately 4 psi at maximum flow of 100,000 lb./hr.

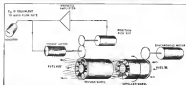
- Weight of the transmitter is 6 lb.; of the indicator 1 lb. In the separate bomber, foot controls a three (two per engine) plus one total flow indicator are used. For a single of about 30 lb. (31.75 lb. is allowed for correct pressure compensation).

- Simplicity: the tank connection between the transmitter and remotely located indicator are three small pipe runs.

Indication is now in pilot position at Control Laboratories, Inc., a wholly owned subsidiary of Lear, Inc., where the flowmeter will soon go into full production.

Why Flowmeter?

"What are the advantages of the flowmeter type of fuel measuring system as opposed to the exponent type?"



INTEGRATING GRAVIMETRIC FLOWMETER measures total fuel flow and provides indication of fuel remaining. Indicator unit consists of pressure transducer.

After effects on the flowmeter and shape of exponent indicator, longer run require an unreasonable number of fuel tank probes if exponent-type gages are used.

On one, spanning separate fighter being built in the contract, a study revealed that 7000 wiring probes would be needed. Besides this large quantity of probes, other complications showed up. Among these all wiring would be buried in the wing making it impossible, an infinite means was changed.

The flowmeter type fuel gage may be installed in the same place's existing fuel lines where this change from the wing into the fuselage, avoiding wiring in the wing and additional equipment exclusively for fuel quantity gaging. Being located in the fuselage, the instruments can be made readily accessible.

When the unit is used as a fuel gage, it is built as a bidirectional flowmeter. The device counts the pounds of fuel pumped into a tank. As fuel is used or transferred to auxiliary tanks, the instrument counts the pounds of fuel leaving the tank, subtracts it from the total and shows fuel remaining in the tank on an easy-to-read digital display.

To cancel out cumulative tolerances, the fuel gage-type instrument includes an automatic reset which resets the device at the end of each cycle. Thus, the counter is automatically driven back to zero although a small quantity of fuel may still be indicated on the dial with the tank full.

Another aspect of the reset means means comes into play if fuel is dropped. The reset signal that is used to dump fuel drives the counter back to zero at an accelerated rate equivalent to discharging at 200,000 lb./hr.

How It Works

Components which make up the Army gravimetric flowmeter are two wheels through which the fuel flows as propeller wheel driven by a constant speed motor and a sensing wheel geared to a torque motor.

In the case of a bidirectional unit, such as a flowmeter used as a fuel quantity gage, there wheels are used—two propeller and one sensing.

The propeller wheel imparts angular momentum to fuel passing through it. This imparts an angular wheel loading to rotate it and back the torque motor to which it is geared.

If the motor's torque does not equal

torque developed in the sensing wheel, a net torque occurs which rotates the gear slowly. A pick-off potentiometer, driven by the gear turn, then develops a voltage. This voltage is sent to the electronic amplifier, where is fed back, amplified to produce an exact balance between the two torques, resulting in equilibrium of the wheels.

The same voltage being fed to the torque motor—which is directly geared to the flow meter—is also fed to the indicating system. Indicator drives either flow rate or, through angular rate gears, quantity of fuel remaining in the tank. The latter type of indicator is a motor-gravimetric used in a bi-directional velocity unit as a count.

To maintain high accuracy over most flow ranges, yet allow outgassing of low flow rates, there uses a scale change technique which incorporates an automatic gear change between the synchronous motor and the propeller wheel. Full output torque signal from the torque transducer is reached within seconds usage.

For higher rates of flow, angular wheel speed is reduced and full torque signal is again achieved at the maximum flow rate. Gear change is made by a solenoid-operated clutch, controlled by a predetermined flow rate, through a microswitch in the indicator.

Linear presentation may be used on the indicator with a vernier wheel. The vernier wheel when the capacitor speed is changed in the transmitter the cap sense of the signal is correspondingly altered, so that there is no discontinuity between flow rate and signal strength in the indicator.

Link has developed a means of canceling out potential errors resulting from cumulative critical manufacturing tolerances which tend to show up in extremely high flow rates. The company also maintains optical pyrometer in manufacturing in long consultation a series to a manufacturer.

Design Considerations

The flowmeter's dial indicators is completely linear and a solid-state pressure readability. Scale change has no effect on presentation.

Because indicator is a servo motor-driven angular torque is available to drive the wheel, and a warning microswitch if required.

The electronic portion of the instrument uses a vacuum tube, magnetic amplifier and high temperature, diffusion transistor circuitry.

A parallel adding circuit can be used in multi-pipe (used to present total fuel flow in a single indicator. The indicating indicator also is capable from each individual transmitter goes to fuel being fed in an indicator, therefore the summation cannot affect indicator errors or malfunctions.

Transmitter uses a frequency conversion circuit which eliminates effects of frequency variations in the aircraft power supply. Therefore the system is immune to speed power supply and operates on the plane's 115 V, 400 cycle ac electrical system.

Transmitter and indicator are not shielded and are completely interchangeable, requiring maintenance and repairs. All adjustments are made at the factory where units are sealed to prevent tampering in the field.

The flowmeter's dimensions: transmitter—14x6x6 in.; indicator—2 in. dia., 7 1/2 in. long.

Friction Saw Speeds TWA Exhaust Repair

Engine exhaust collector rings are saved again in successful time previously reported at TWA World Aircraft base at Kean City, Kan.

TWA uses a new lightweight, friction saw which slices through second alloy exhaust stack in 10 sec. Details of the Model M-8 DeVil Co. saw blade speed: 6000-7000 surface ft./min., power—74-hp electric motor 36-in. diameter aluminum motor collector ring.



USAF Getting F-102A Simulator

Latest in Link Aviation's line of flight simulators is a unit for the Air Force's supersonic F-102A fighter. Several simulators will soon be installed at Tyndall AFB, Fla.

Major deviation from real prototype design practice in the F-102A device is a switch from air to electric control.

Link uses the change makes possible more accurate computing over a greater range of aerodynamic variables and more precise and realistic simulation of the plane's response to control forces and atmospheric disturbances—important considerations in supersonic training devices.

Concurrent benefits of using dc computation are reduction in number and size of amplifiers, greater component standardization and a generally more efficient operation, according to the manufacturer.

Flexible blade adaptability system, developed for the F-102 simulator, makes possible more accurate observation of such variables as engine thrust,

fuel flow and pressure ratios, which are standard characteristics of an engine in three other variables. Link says that gas turbine technology makes such accurate simulation reproducible.

Swing facilities have been provided to switch simulators from manual operation to autopilot. The simulators incorporate an F-102 cockpit, instructor's jump seat and an operator's pit two and control panels. Three automatic recorders keep track of ground position, altitude and range, and air brake and glide path. The entire "training area" is air conditioned.

Outside are two double rows of steel cabinets housing the simulator's electronic control equipment. Necessity of size points to use of maintenance have been reduced by using revolving amplifier racks mounting plug-in type amplifiers.

Simulator was developed by Link in cooperation with Wright Air Development Center and the Air Research and Development Command.

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Combine the precision and confidence of a built-around jet, the scientific approach of a test pilot and up to the minute knowledge of what makes a Scorpion P-83D intercepter "tick" and you have the Northing Operations Redaction rate. "Dipsos" won't even be among the many types of Northing field specialists who work with Air Force pilots and technicians to develop peak tactical superiority for the rocket-armed Northing Scorpions which now form our first line of defense against enemy air aggression. Their counsel is an important part of weapons system engineering at Northing Airfield. Northing is producing the famous Scorpion P-83 series, a new intrasoundable A bomb carrier, the Northing P-83D pilocaine breather, and many other clearly-guarded Northing weapons systems of defense. In accomplishing such strategic objectives Northing has, since 1939, led the world in the design and production of all manner and useless aircraft.



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High-Capacity Fans Need Little Power

A new line of axiflow blowers for air, sea, ground and industrial applications, provides high air capacities but has low power requirements. They are manufactured by Peto Products under license from the English firm, Plessey, Ltd.

The line count in several users, with initial capacities ranging from 16 to 700 cba.

Principal solvent uses are for vents, living storage gas, cockpits and cabins, breathing air in passenger aircraft, defrosting windshields, spot ventilating uses and cooling helicopter engine oil.

The smallest flower in the sea, *Utricularia* 30 μ m in diameter, weighs 8 μ g and displaces 16 μ l of air at 0.75 m of water. The Pisco electric motor during the blowers measures less than 1 mm in diameter.

Other standard production units will range up to 6 m in diameter and be available in single or multi-stage blow on and will be produced by either a.c. or d.c. fusion process.

The blowers are designed for rugged duty, to withstand severe conditions of shock, temperature, pressure, altitude and humidity, and are rated for continuous operation at high ambient temperatures.

Pizzo says compact design and lightweight construction allow high air discharge placement with minimum size and weight. Power losses are kept at a minimum and space savings are made possible because the units may be oriented within a duct system. Blower assemblies are dynamically balanced for smooth, quiet operation.

Units are supplied with either flange or clip mountings, will operate in air, puritan and are low temperature grade in sealed potrooms bearings for reliable high altitude operation. Either totally enclosed or explosion-proof motors are available.



AXIAL-FLOW BLOWERS made by Procon make lower than British firm, Flansburg Ltd. Contra House is designed for the mounting, offers two fan shaft mounting. Position has no effect on axial efficiency.



Strain Gages Check Airship Cable Tension

New system of applying tension to the steel cables that support sways can speed up the job and greatly improve accuracy.

On a lighter-than-air ship such as the 250-ft. mast-baggy schooner line, most of the load is carried by two longitudinal "railway tracks" to which are attached flexible steel cables leading from 21 suspension points on the ship's deck to 12 equally spaced counterweights hung on the railway carriages. Proper positioning of the cables is important for correct distribution of the load on the 127,000-oz. ft. ship.

By using Ballou's Low-Humidity SR-4 transducers incorporating SR-4 strain gages, the job can be done by four or five men working the transducers at three hours, following a one-hour set-up period by two men. Previously it took a full day. Accuracy is held within 1% or 1 lb; it used to vary from 30 to 15%.

Each transmitter is mounted by elec-



trial slide through a 24-point weighing scale to a descending transverse indicator, where the operator controls adjustments made by turnable cross. The instruments are kept in a plywood cabinet mounted on a rubber road wheel.

OFF THE LINE

Danvers Aviation Associates has purchased Industrial Associates, Inc., and is transferring all personnel and physical assets of the latter from Los Angeles International Airport to Danvers's Long Beach, Calif., facilities. Industrial Associates will continue as a division of Danvers. It specializes in airframe and accessory replacement parts for DC-3, -4 and -6 airplanes.

Republic Aviation test pilots have made over 170 000 takeoffs and landings

from their Farmingdale, N. Y., article and have flown over 50,000 hours during the past 10 years without damage to any neighbor's person or property, the company says.

New high-temperature gasketing films for aircraft and guided missiles are being produced experimentally by Du Pont's Fibers Division. Material is made of Teflon polytetrafluoroethylene film impregnated with Teflon resin. Non-woven films can withstand temperatures up to 400° almost indefinitely and can be boiled in aqueous or fuming sulphuric acid without adverse effect.

MEMO
ON TIME
 From: Engineering & Production
 To: Sales Department
 Subject: Size 8 and 22 Synchros

As promised last November, our size 8 and 22 standard synchros are now in production and available for 3 weeks or less delivery.

In addition, we have added the BuOrd type size 15 transmitter to the line.

Next
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BONUS

Size 15
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BuOrd Size 15
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ACTUAL SIZE

Size 22
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ACTUAL SIZE

Size 8
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ACTUAL SIZE

CLIFTON PRECISION PRODUCTS CO., INC.
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Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Ralston Ave., Philadelphia 11, are:

Shenandoah Mfg. Co., 1651 44th Street, Erie, Pa., has received an order for 51 units, 483,242 dollars (maximum) for replacement pumps, 488,922.

Aeronautical Corp., 204 DuPont St., Providence 12, R. I., has received an order for 314,775.

W. J. Gosselin Co., 110 S. Main St., Boston 12, Mass., has received an order for 27,000.

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COCKPIT VIEWPOINT

By Capt. R. C. Bullock



Traffic Control by Machine

Finding new ways with which to stress the importance of an air traffic control is nearly impossible. Fortunately it was not too late. By the late late date just about everybody realizes that an efficient system is vital to the growth of aviation.

Much headway has been made in recent years. The use of radar has given controllers a most useful tool. The use of multiple radios, one-way traffic and restrictions on altitudes have likewise added to the flow of traffic.

No Middlemen Wanted

The worst traffic mishap which it was planned was and is the failure of having pilots talk directly to the controller. Until this innovation came about several "middlemen" were required for radio purposes. Using this older method the average one-way time for a clearance message was 12 seconds. This placed a too limit on the number of given aircraft could control.

So progress is being made although even those closer to the work are the first to admit that we still have a long way to go.

Now despite this direct operator talk about progress there are indications that a word of caution is needed to those engaged in designing our traffic systems. That word is that traffic control is not the ONLY problem connected with moving an aircraft from here to there.

The point is that at times we seem to be engaged in building an inflexible manner of a machine in which efficiency is the motto and with which decisions will be stamped out without regard for individuality.

Right here I suppose there will be someone to the effect that this sounds so pilot is soon understanding a process because it is too efficient and he wants individual attention.

Well, pilots have been such in the fact no two flights are ever exactly alike. They learn that this is dealing with pilots moving down an available line but with loads of live people whose comfort and safety take a side precedence over "on time" arrivals.

Efficiency vs. Flexibility

Unquestionable a clear, set-and-forget procedure will appear to move more rapidly. But the procedure may not always be tolerable by each flight.

Right now for instance, an aircraft flying over New York cannot get a lower altitude than 10,000 feet regardless of the fact that the lower level may be vacant as that wing conditions or thunderstorms make 10,000 feet high undesirable. In other cases a flight may be confined to a lower altitude, when a higher one would be better.

And the same situation exists as to routes. A northbound flight will be confined to the appropriate routes, from the traffic control standpoint regardless of the fact that flight conditions and the flight plan call for another way.

These various thoughts are not an attempt to belittle the success efforts of many people and the desires they are attempting to take. But in the quest for precision in quantity great care must be taken to avoid assembly-line, moving belt-technique where even man-made it to an inflexible plan.

The issue has not come when we make weather conditions can be highly disrupted in the interests of traffic management. And the necessity of radio reports, reports, reports, reports or two minutes does not lead the pilot much more time to consider the needs of his passengers.

The airline industry, pushed stiff on being able to give its customers safety, comfort and scheduled rates. Let it not be said that we are looking up a machine which will remove the human side of these three items in the long run, such a scheme might lose more passengers than it would gain.

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AIR TRANSPORT

Examiner Backs Air Charter Exchange

Failure to relax present irregular restrictions would be 'tragically shortsighted,' says CAB's Pfeiffer.

By Craig Lewis

Washington, D. C.—Temporary repeal of an charter exchange ban took route to Air Charter Exchange Act and Independent Military Air Transport Act has been recommended by Civil Aeronautics Board Chairman Paul H. Pfeiffer.

In his report, Pfeiffer observes that the airlines are enjoying a period of general prosperity and says that failure to relax some of the restrictions on irregular commercial operations is the primary reason a larger economic foundation without cost to the taxpayer in such a period would appear to be "tragically short-sighted."

Pfeiffer says that a substantial air charter passenger and freight potential exists, which is not being realized because of the continued reason "being" are presently tethered to the demands of the scheduled service. He stresses needs development of this potential through use of the ACTA and IMATA exchanges for an experimental three year period.

The report would authorize use of selective facilities of the two exchanges for both passenger and freight charters on domestic aircraft and freight charters only in overseas service.

No Competition Restraint

In relation to certain communications of approval of the exchanges, Pfeiffer says. The pooling of irregular air charter facilities into two separate entities would not seem to require separate competition in a substantial segment of the airline industry.

Rather, similar to the Nash-Hadcock and Stouffer-Peckham mergers in the automobile industry (which the Department of Justice has apparently approved) the two proposals now greatly improve the efficiency, economy and public acceptance of irregular air charter operations so as to increase rather than decrease the effectiveness of competition between the scheduled and the irregular air/line industry.

Pfeiffer finds that the evidence in the investigation favors the proposition that a primary purpose of the charter ban was to lower the cost of charter air transport to the Defense Department in particular and thereby and shipping public in general by releasing ferry indus-

try and heavier charges through close operational coordination of irregular carriers.

"Finally," he says, "a general of both exchanges proposals would, at nothing, authorize competition among the irregular by introducing a degree of order for commercial charter procurement on a nationwide scale and generally evident."

At the end of 1954, the two eligible members of IMATA owned or leased 76 aircraft. The thirty eligible members of ACTA had 89 aircraft on the same date.

Charter Restrictions

The report recommends that ACTA, but not IMATA, be allowed to operate for those placed under the following restrictions:

- For passenger charters, a maximum of two groups per DC-3, three groups per C-46, Martin 2-2-2 and 48-4 and C-54, four 240 and 140 aircraft as three DC-3 or C-47 flights.
- For freight charters, a maximum of two loads per C-46, three loads per DC-3 and four loads per DC-4A, C-54, C-59, C-60, C-61, C-62, C-63, C-64, C-65, C-66, C-67, C-68, C-69, C-70, C-71, C-72, C-73, C-74, C-75, C-76, C-77, C-78, C-79, C-80, C-81, C-82, C-83, C-84, C-85, C-86, C-87, C-88, C-89, C-90, C-91, C-92, C-93, C-94, C-95, C-96, C-97, C-98, C-99, C-100, C-101, C-102, C-103, C-104, C-105, C-106, C-107, C-108, C-109, C-110, C-111, C-112, C-113, C-114, C-115, C-116, C-117, C-118, C-119, C-120, C-121, C-122, C-123, C-124, C-125, C-126, C-127, C-128, C-129, C-130, C-131, C-132, C-133, C-134, C-135, C-136, C-137, C-138, C-139, C-140, C-141, C-142, C-143, C-144, C-145, C-146, C-147, C-148, C-149, C-150, C-151, C-152, C-153, C-154, C-155, C-156, C-157, C-158, C-159, C-160, C-161, C-162, C-163, C-164, C-165, C-166, C-167, C-168, C-169, C-170, C-171, C-172, C-173, C-174, C-175, C-176, C-177, C-178, C-179, C-180, C-181, C-182, C-183, C-184, C-185, C-186, C-187, C-188, C-189, C-190, C-191, 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\$63 Million Annual Airport Aid Wins Unanimous Senate Approval

Washington, D.C.—Legislation guaranteeing \$63 million federal aid for airport development annually for the next four years was unanimously passed by the Senate despite the Administration's opposition.

Under the measure, Civil Aeronautics Administration would be authorized to enter contracts with state and local governments each year for fiscal 1956 through fiscal 1959—up to \$63 million, and Congress would be authorized to appropriate funds to cover the contracts. Up to now, under the terms of the 1946 Airport Development Act, CAA has had to obtain appropriations first, before contracts could be made.

If the measure is enacted, \$31 million would be available for fiscal 1956 and the \$63 million authorization—\$30 million for continental programs and \$3 million for territorial projects, plus \$20 million in a direct appropriation already approved by both House and Senate (AW June 22, p. 11).

No word of opposition was expressed during last Senate consideration of the measure which was introduced by Sen. Mike Monroney (D-Ga.), chairman of the Senate Commerce and Labor Subcommittee. Two Republic senators—F. B. Case (Me.) a member of the Senate Commerce Committee, and Frank Baugh (W-Va.)—joined Monroney in urging its enactment.

Good Facility Needs
In his Senate presentation, Monroney stressed the urgency of improving facilities for jet aircraft and cargo operations (AW May 9, p. 11).

"There is growing public interest in modernizing the airport program," Monroney said. "Civil aviation depends on the U.S. air transportation system for its growth and development. It is a fact that the nation's airports are in a state of disrepair and need to be modernized. The need for modern airports is a fact that is becoming increasingly apparent. The need for modern airports is a fact that is becoming increasingly apparent. The need for modern airports is a fact that is becoming increasingly apparent."

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buildings and other airport infrastructure facilities" and "shall not be held responsible for the cost of public airports." These provisions would void the administrative rulings of the Commerce Department for the past two years limiting federal aid for terminal facilities and fuel oil airports.

Conflicting Views

Civil Aeronautics Board Chairman Ross Hutton has given general support to the proposal, but the Monroney bill is sharply criticized, stable airport program.

Under Secretary of Commerce for Transportation Louis Rothchild, speaking for the Administration, opposed the bill as method of accomplishing a "stable program."

He also mentioned that federal airport funds should continue to be a matter of annual appropriations (AW June 15, p. 11).

Monroney told the Senate "The Commerce Committee is completely in disagreement with the view of the Administration and the Department of Commerce as to their failure of the bill and is extremely disappointed that the Administration and the department have taken the position."

Monroney requested the committee to have been made the system of annual appropriations.

In 1953, the entire program was shut down as the Secretary of Commerce conducted a survey to determine the need for federal assistance in public airport development. Despite the fact that many states and cities were in the midst of planning airport work, or in completing financing arrangements, the program was shut down as its criteria for use had been set.

Then, a strong report found that federal help for airport construction was justified. That fresh authorization could stimulate design, and for 1955 federal aid, after no appropriations for 1954, the sum of \$22 million was appropriated. At that time it was stated that because the program had slowed down, the rest of the year had no funds were provided, and in 1956 would be needed for the first year of its institution.

But when we came to the next year with great anticipation as an airport man, we find that instead of an increase, the budget Bureau has set aside for each of the insufficient sum of \$22 million appropriated last year—and only \$11 million was recommended for fiscal 1955. (Congress increased this \$11 million to \$18 million.)

Proposed Airport Aid

This is how the \$63 million a year in federal airport aid provided in the Monroney bill would be divided.

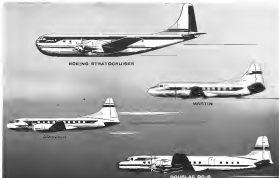
State	Amount
Alabama	\$835,180
Arizona	979,540
Arkansas	679,818
California	2,714,890
Colorado	918,269
Connecticut	346,256
Delaware	64,980
District of Columbia	118,271
Florida	811,856
Georgia	942,419
Idaho	604,985
Illinois	1,731,451
Indiana	952,715
Iowa	806,127
Kansas	852,285
Kentucky	731,174
Louisiana	760,519
Maine	355,763
Maryland	459,234
Massachusetts	767,162
Michigan	1,654,994
Minnesota	1,871,165
Mississippi	676,073
Missouri	1,846,683
Montana	2,157,301
Nebraska	799,013
Nevada	827,050
New Hampshire	147,116
New Jersey	781,667
New Mexico	985,691
New York	2,686,231
North Carolina	949,498
North Dakota	635,945
Oklahoma	1,511,101
Oregon	841,462
Pennsylvania	987,127
Rhode Island	1,827,136
South Carolina	542,713
South Dakota	657,246
Tennessee	706,404
Texas	1,899,777
Utah	719,824
Vermont	126,216
Virginia	803,025
Washington	863,670
West Virginia	479,132
Wisconsin	991,466
Wyoming	774,739

Total State Grants—45,066,660
Discretionary Funds—15,000,000

Total Funds for Continental United States—60,066,660

Alaska	1,150,000
Hawaii	750,000
Puerto Rico	600,000
Virgin Islands	300,000

Total—1,800,000
Grand Total—\$63,866,660



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Court Rules Air Belongs to Public, Voids Local Ban on Low Flying

A Federal District Court ruling last week that an area is part of the public domain shields the threat to airports and airport users of local community regulations banning low flying for safety and landing.

The decision, made by Judge Walter Brackhausen in Brooklyn, ruled mere operation of a local ordinance of Columbus, N. Y., banning low flying in flight below 1,000 feet over the area voided. The judge permanently enjoined Columbus from enforcing the ordinance. It is the first Federal Court ruling in the country to deal with the issue.

U. S. Attorney Leonard Moore and Judge Brackhausen's decision would have a far-reaching effect on every airport in the country. He pointed out that numerous other communities were commercial airports have airport noise ordinances. Columbus attorneys said that whether an appeal would be made is to be determined at the next village trustees' meeting on July 11.

Airspace Is Public Domain

The Callahan low flying ordinance was enacted to become effective June 15, 1957, but its enforcement was held up by a temporary injunction. This is the first time a municipality to fly over Columbus at less than 1,000 feet and caused a penalty of \$100 fine or six months in jail for violators.

The 100 included action being taken by the Port of New York Authority, Civil Aeronautics Administration and the Civil Aeronautics Board filed suit for a permanent injunction against the village. The U. S. Attorney also agreed to file the injunction as a non-party defendant. In Judge Brackhausen last October.

The findings were based on a 16-page opinion which upheld the argument that Congress had purchased the air space in passing the Civil Aeronautics Act of 1938. In declaring the Columbus ordinance "null and void" and setting the permanent injunction, Judge Brackhausen said the ancient doctrine that the who owned the land owned the air above it is no longer valid. He said air space is part of the public domain.

Use in Pending Cases

Judge Brackhausen declared that Congress had the power to regulate air traffic in navigable air space and because they have been adapted comparatively air traffic plans for operations around airports the municipalities have no legal right to establish their own flying regulations. He noted that other

courts have upheld the intent of Congress to control the air space.

The opinion declared that the only valid states, including such political subdivisions as Columbus, were included from creating conflicting regulations. Judge Brackhausen commented that "the fact that various states have legislated in the field of air traffic regulations is no indication that Congress did not intend to preempt the field by the enactment of the 1938 act."

The Brooklyn panel held that "if other villages and communities adopt flying airports should have similar statutes, airports for all practical purposes would cease to function." He referred to testimony at the October hearings that with enforcement of the Columbus ordinance there would be substantial restriction of operation of both domestic and international airports to and from the Idlewild Airport and the possible closing of the airport.

Immediate effect of the decision will be its impact on other pending cases around the country, where airports are being used. Next two leading cases involve airport operations at Pittsburgh and Seattle, where suits have been brought in neighboring counties for trespass and nuisance from aircraft flying over the field.

CAB ORDERS

(See Page 22)

GRANTED

THE American-Cuba Airways permit to operate, as the only existing application of Government National De Facto Airline Code License for a foreign air carrier.

U. S. Customs Airline is recognized to perform one flight from New York to Los Angeles and back.

License to operate in the Eastern Air Line route memorandum one to the Civil Aeronautics Board, American Airlines, Inc., and the Civil Aeronautics Board.

License to operate in the Trans-Atlantic route memorandum one to the Civil Aeronautics Board, American Airlines, Inc., and the Civil Aeronautics Board.

BA System, Inc. is recognized to perform flights on transportation of persons and property with helicopter under the Second, Third and Fourth Federal Districts of the Territory of Alaska, for two years.

Second and Western Airlines are ex-

pected to perform one flight from New York to Los Angeles pursuant to a contract with U. S. Customs & Co., Ltd., agents for Heston & Son Ltd.

U. S. Customs Airline is recognized to perform one flight from New York to Vancouver, British Columbia, Scotland, and Paris pursuant to a contract with the Heston & Son Ltd.

Trans-Atlantic Air Line is recognized to perform one flight from Athens, Greece, to New York pursuant to a contract with the Heston & Son Ltd.

Approved

Agreements between various members of the Independent Military Air Transport Association and Air Canada Transport Association to operate in the various military aircraft.

Application of various Airline and Canadian Air Lines for continued operation of service to various Airline of various Airline.

An agreement between various members of the Air Traffic Conference of American Airlines to operate in the various Airline of various Airline.

Approved

Flying Tiger Line's authorization to perform one flight from New York to Los Angeles and back.

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Capital's Viscounts Appear

Capital Airlines will open the gas turbine powered transport era on U. S. routes this month, beginning scheduled service between Washington and Chicago on July 26. The choice of compressors and swirl of lacquer is destined to replace the popping pistons and blue smoke clouds as the standard sounds and sights on airline ramps around the world.

The fact that the first turbine powered transport to fly under U. S. colors will be British manufactured offers proof that technical progress is the only genuine yardstick for advancement in aviation. Nationalistic pride and restrictions have no place in an endeavor so revolutionary and international as aviation.

"Slim" Carraichall, Capital's president, makes it clear that he picked the Viscount Viscount, powered by Rolls-Royce Dart turboprops, for its 60 phase first replacement program for strictly competitive business reasons. Among the key factors in his decision "Slim" Carraichall lists:

- **Competition with the Big Four airlines.** Carraichall says about 80% of Capital's route structure path lies in direct competition with American, United, TWA and Eastern where Capital has suffered from lack of modern equipment to meet the challenge of these strong competitors. Introduction of the Viscount will give Capital an equipment edge over those competitors for the first time in its history—an edge that will last at least three years until the appearance of the turboprop powered Lockheed Electra.

- **Cost savings.** Cost of the Viscount fleet was within Capital's financing capabilities and was assisted by a favorable sale of Consolidation to British Overseas Airways Corp. Capital also expects to save money by standardizing on the Viscount as a replacement for its present assortment of Consolidations, DC-4s and DC-3s.

- **Timing.** Capital could get delivery of the Viscount in 1955 while similar types offered by U. S. manufacturers will not be available until several years later. By getting the Viscount into operation in 1955 Capital will gain a three to five year head start in the turbine powered air service.

- **Passenger appeal.** After flying in the Viscount and studying British European Airways experience, Carraichall was convinced that the turboprop transport offered a distinct appeal to the traveling public due to its greatly reduced noise and vibration level. The Viscount is, he notes, a "quietest of vibrationless aircraft." Not at times over half as loud as an airplane. But the Viscount is noticeably more comfortable riding than a piston powered transport.

The Viscount already has proved to be a formidable competitor to piston powered transports in Europe, in Australia and now in North America where Trans Canada is boosting its share of the Toronto-New York traffic with the Vikings aircraft. Capital's traffic figures

on the highly competitive Washington-Chicago route after the Viscount gets into service should be interesting.

Capital Airlines has grown and prospered under "Slim" Carraichall's stewardship. It will be interesting to see whether the Viscount first replacement program he initiated will prove to be another significant step in the increasing stature and prosperity of Capital among the domestic airlines.

Atlantic Travel Boom

Pan American World Airways' completion of its 50,000th trans-Atlantic crossing on June 28 highlights two major facts in this area.

First, the turbine program that has been made in linking Europe and North America by air, since Pan American pioneered the first scheduled passenger service across the Atlantic in Boeing flying boats 16 years ago.

Second, the tremendous air travel boom now in progress across the Atlantic that will certainly set new traffic records for both coach and first class travel.

Compared with the twice weekly flying boat service that often took 24 hours from Newfoundland to Europe in 1939, Pan American now dispatches 116 flights weekly to Europe in Boeing Stratocruisers and Douglas DC-4s and DC-7Bs that can fly nonstop to London in 12 to 14 hours. During the last week in June 599 U. S. and foreign aircraft arrived from or departed for Europe at Idlewild Airport alone.

For the second straight year airlines will carry more people to Europe than shoreships. Last year's record of 580,000 trans-Atlantic airline passengers seems certain to be boosted by at least 10% this year.

More Moscow Air Shows

Although the major air display celebrating Red Air Force Day failed to attract over Moscow on June 19 as predicted to American Wives by three Russian air engineering officers attending the recent Canadian International Air Show (IAW, June 13 p. 17), the day over the Soviet capital has been filled with modern jet aircraft almost daily in recent weeks. Stewart Alsop, reporting from Moscow, noted between 150 and 200 turboprop bombers, turboprop bombers and turboprop fighters in the air on the day of the official reception for Indian Prime Minister Nehru. The younger Alsop brother also reported that formation flights of Russian jet planes have become a daily routine over Moscow, usually around 11 am or 4 pm. He also reports the Red Air Force celebration is now believed to be scheduled for a Sunday in July.

Despite these daily exhibits of the latest Russian aircraft over Moscow, the Department of Defense refuses to release pictures of these planes taken during public displays so that the American public, too, can see them. How much longer will this face continue?

—Robert Hots

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